40/pt. 100-149/990

code of federal regulations

Protection of Environment

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PARTS 100 TO 149
Revised as of July 1, 1990

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Protection of Environment

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PARTS 100 to 149

Revised as of July 1, 1990

CONTAINING
A CODIFICATION OF DOCUMENTS
OF GENERAL APPLICABILITY
AND FUTURE EFFECT

AS OF JULY 1, 1990

With Ancillaries

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Cite this Code: **CFR**

To cite the regulations in this volume use title, part and section number. Thus, 40 CFR 104.1 *refers to Title 40, Part 104, section 1.*

Explanation

The Code of Federal Regulations is a codification of the general and permanent rules published in the Federal Register by the Executive departments and agencies of the Federal Government. The Code is divided into 50 titles which represent broad areas subject to Federal regulation. Each title is divided into chapters which usually bear the name of the issuing agency. Each chapter is further subdivided into parts covering specific regulatory areas.

ISSUE DATES

Each volume of the Code is revised at least once each calendar year and issued on a quarterly basis approximately as follows:

Title 1 through Title 16...as of January 1
Title 17 through Title 27...as of April 1
Title 28 through Title 41...as of July 1
Title 42 through Title 50..as of October 1

The appropriate revision date is printed on the cover of each volume.

LEGAL STATUS

The contents of the Federal Register are required to be judicially noticed (44 U.S.C. 1507). The Code of Federal Regulations is prima facie evidence of the text of the original documents (44 U.S.C. 1510).

HOW TO USE THE CODE OF FEDERAL REGULATIONS

The Code of Federal Regulations is kept up to date by the individual issues of the Federal Register. These two publications must be used together to determine the latest version of any given rule.

To determine whether a Code volume has been amended since its revision date (in this case, July 1, 1990), consult the "List of CFR Sections Affected (LSA)," which is issued monthly, and the "Cumulative List of Parts Affected," which appears in the Reader Aids section of the daily Federal Register. These two lists will identify the Federal Register page number of the latest amendment of any given rule.

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Each volume of the Code contains amendments published in the Federal Register since the last revision of that volume of the Code. Source citations for the regulations are referred to by volume number and page number of the Federal Register and date of publication. Publication dates and effective dates are usually not the same and care must be exercised by the user in determining the actual effective date. In instances where the effective date is beyond the cut-off date for the Code a note has been inserted to reflect the future effective date. In those instances where a regulation published in the Federal Register states a date certain for expiration, an appropriate note will be inserted following the text.

OMB CONTROL NUMBERS

The Paperwork Reduction Act of 1980 (Pub. L. 96-511) requires Federal agencies to display an OMB control number with their information collection request. Many agencies have begun publishing numerous OMB control numbers as amendments to existing regulations in the CFR. These OMB numbers are placed as close as possible to the applicable recordkeeping or reporting requirements.

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Provisions that become obsolete before the revision date stated on the cover of each volume are not carried. Code users may find the text of provisions in effect on a given date in the past by using the appropriate numerical list of sections affected. For the period before January 1, 1973, consult either the List of CFR Sections Affected, 1949-1963, or 1964-1972, published in three separate volumes. For the period beginning January 1, 1973, a "List of CFR Sections Affected" is published at the end of each CFR volume.

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What is incorporation by reference? Incorporation by reference was established by statute and allows Federal agencies to meet the requirement to publish regulations in the Federal Register by referring to materials already published elsewhere. For an incorporation to be valid, the Director of the Federal Register must approve it. The legal effect of incorporation by reference is that the material is treated as if it were published in full in the Federal Register (5 U.S.C. 552(a)). This material, like any other properly issued regulation, has the force of law.

What is a proper incorporation by reference? The Director of the Federal Register will approve an incorporation by reference only when the requirements of 1 CFR Part 51 are met. Some of the elements on which approval is based are:

(a) The incorporation will substantially reduce the volume of material published in the Federal Register.

(b) The matter incorporated is in fact available to the extent necessary to afford fairness and uniformity in the administrative process.

(c) The incorporating document is drafted and submitted for publication in accordance with 1 CFR Part 51.

Properly approved incorporations by reference in this volume are listed in the Finding Aids at the end of this volume.

What if the material incorporated by reference cannot be found? If you have any problem locating or obtaining a copy of material listed in the Finding Aids of this volume as an approved incorporation by reference, please contact the agency that issued the regulation containing that incorporation. If, after contacting the agency, you find the material is not available, please notify the Director of the Federal Register, National Archives and Records Administration, Washington DC 20408, or call (202) 523-4534.

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A subject index to the Code of Federal Regulations is contained in a separate volume, revised annually as of January 1, entitled CFR INDEX AND FINDING AIDS. This volume contains the Parallel Table of Statutory Authorities and Agency Rules (Table I), and Acts Requiring Publication in the Federal Register (Table

III). A list of CFR Titles, Chapters, and Parts and an alphabetical list of agencies publishing in the CFR are also included in this volume.

An index to the text of "Title 3—The President" is carried within that volume.

The Federal Register Index is issued monthly in cumulative form. This index is based on a consolidation of the "Contents" entries in the daily Federal Register.

A List of CFR Sections Affected (LSA) is published monthly, keyed to the revision dates of the 50 CFR titles.

REPUBLICATION OF MATERIAL

There are no restrictions on the republication of material appearing in the Code of Federal Regulations.

INQUIRIES AND SALES

For a summary, legal interpretation, or other explanation of any regulation in this volume, contact the issuing agency. Inquiries concerning editing procedures and reference assistance with respect to the Code of Federal Regulations may be addressed to the Director, Office of the Federal Register, National Archives and Records Administration, Washington, D.C. 20408 (telephone 202-523-3517). Sales are handled exclusively by the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 (telephone 202-783-3238).

Martha L. Girard,
Director,
Office of the Federal Register.

July 2, 1990.

THIS TITLE

Title 40—PROTECTION OF ENVIRONMENT is composed of fifteen volumes. The parts in these volumes are arranged in the following order: Parts 1-51, Part 52, Parts 53-60, Parts 61-80, Parts 81-85, Parts 86-99, Parts 100-149, Parts 150-189, Parts 190-259, Parts 260-299, Parts 300-399, Parts 400-424, Parts 425-699, Parts 700-789 and Part 790 to End. A derivation table appears in the volume containing Parts 1-51. The contents of these volumes represent all current regulations codified under this title of the CFR as of July 1, 1990.

Chapter I—Environmental Protection Agency appears in all fifteen volumes. A Pesticide Tolerance Commodity/Chemical Index appears in Parts 150-189. A Toxic Substances Chemical—CAS Number Index appears in Parts 700-789 and Part 790 to End. Distribution Tables appear in the volumes containing Parts 100-149 and Parts 190-299. Redesignation Tables appear in the volumes containing Parts 1-51, Parts 81-85, Parts 86-99, Parts 150-189, and Parts 700-789. Regulations issued by the Council on Environmental Quality appear in the volume containing Part 790 to End.

For this volume, Kent H. Giles was Chief Editor. The Code of Federal Regulations publication program is under the direction of Richard L. Claypoole, assisted by Alomha S. Morris.

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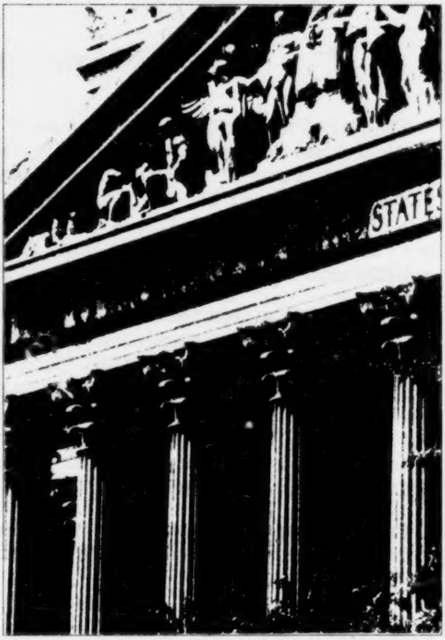

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Title 40—Protection of Environment

(This book contains Parts 100 to 149)

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CHAPTER I—ENVIRONMENTAL PROTECTION AGENCY (CONTINUED)

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SUBCHAPTER D—WATER PROGRAMS

PART 100—[RESERVED]

PART 104—PUBLIC HEARINGS ON EFFLUENT STANDARDS FOR TOXIC POLLUTANTS

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104.16 Filing and time.

AUTHORITY: Secs. 501 and 307(a) of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 *et seq.*, Pub. L. 92-500, 86 Stat. 816).

SOURCE: 41 FR 17902, Apr. 29, 1976, unless otherwise noted.

§ 104.1 Applicability.

This part shall be applicable to hearings required by statute to be held in connection with the establishment of toxic pollutant effluent standards under section 307(a) of the Act.

§ 104.2 Definitions.

As used in this part, the term:

(a) "Act" means the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 *et seq.*, Pub. L. 92-500, 86 Stat. 816.

(b) "Administrator" means the Administrator of the Environmental Protection Agency, or any employee of the Agency to whom the Administrator may by order delegate his authority to carry out his functions under section 307(a) of the Act, or any person who shall by operation of law be authorized to carry out such functions.

(c) "Agency" means the Environmental Protection Agency.

(d) "Hearing Clerk" means the Hearing Clerk, U.S. Environmental Protection Agency, 401 M Street SW., Washington, D.C. 20460.

(e) "Party" means the Environmental Protection Agency as the proponent of an effluent standard or standards, and any person who files an objection pursuant to § 104.3 hereof.

(f) "Person" means an individual, corporation, partnership, association, state, municipality or other political subdivision of a state, or any interstate body.

(g) "Effluent standard" means any effluent standard or limitation, which may include a prohibition of any discharge, established or proposed to be established for any toxic pollutant under section 307(a) of the Act.

(h) "Presiding Officer" means the Chief Administrative Law Judge of the Agency or a person designated by the Chief Administrative Law Judge or by the Administrator to preside at a hearing under this part, in accordance with § 104.6 hereof.

§ 104.3 Notice of hearing; objection; public comment.

(a) *Notice of hearing.* Whenever the Administrator publishes any proposed effluent standard, he shall simultaneously publish a notice of a public hearing to be held within thirty days following the date of publication of the proposed standard. Any person who has any objection to a proposed standard may file with the hearing clerk a concise statement of any such objection. No person may participate in the hearing on the proposed toxic pollutant effluent standards unless the hearing clerk has received within 25 days of the publication of the notice of the proposed standards a statement of objection as herein described. In exceptional circumstances and for good cause shown the Presiding Officer may allow an objection to be filed after the filing deadline prescribed in the preceding sentence, which good cause must include at a minimum lack of actual notice on the part of the objector or any representative of such objector of the proposed standards despite his exercise of due diligence, so long as such later filing will not cause undue delay in the proceedings or prejudice to any of the parties.

(b) *Objections.* Any objection to a proposed standard which is filed pursuant to paragraph (a) of this section shall meet the following requirements:

(1) It shall be filed in triplicate with the hearing clerk within the time prescribed in paragraph (a) of this section;

(2) It shall state concisely and with particularity each portion of the proposed standard to which objection is taken; to the greatest extent feasible it shall state the basis for such objection;

(3) To the greatest extent feasible it shall (i) state specifically the objector's proposed modification to any such standard proposed by the Agency to which objection is taken, (ii) set forth the reasons why such modification is sought, and (iii) identify and describe the scientific or other basis for such proposed modification, including reference to any pertinent scientific data or authority in support thereof.

Any objection which fails to comply with the foregoing provisions shall not be accepted for filing. The Presiding Officer shall promptly notify any person whose objection is not accepted for any of the reasons set forth in this section, stating the reasons therefor.

(c) *Data in support of objection or modification.* In the event that the time prescribed for filing objections pursuant to paragraphs (a) and (b) of this section is insufficient to permit an objecting party to fully set forth with such objection the basis therefor together with the information and data specified in paragraph (b) (3) of this section, he may so state at the time of the filing of such objection, and file a more complete statement of such basis, information, and data (hereinafter referred to as "supplemental data") within the time prescribed by this paragraph (c). The supplemental data herein described shall be filed not later than 40 days following publication of the proposed effluent standards.

(d) *Public comment.* The notice required under paragraph (a) of this section shall also provide for the submission to the Agency of written comments on the proposed rulemaking by interested persons not filing objections pursuant to this section as hereinabove described, and hence not participating in the hearing as parties. The notice shall fix a time deadline for the submission of such comments which shall be not later than the date set for commencement of the hearing. Such comments shall be received in evidence at the commencement of the hearing. The Administrator in making any decision based upon the record shall take into account the unavailability of cross-examination in determining the weight to be accorded such comments.

(e) *Promulgation in absence of objection.* If no objection is filed pursuant to this section, then the Administrator shall promulgate the final standards on the basis of the Agency's statement of basis and purpose and any public comments received pursuant to paragraph (d) of this section.

§ 104.4 Statement of basis and purpose.

Whenever the Administrator publishes a proposed effluent standard, the notice thereof published in the FEDERAL REGISTER shall include a statement of the basis and purpose of the standard or a summary thereof. This statement shall include:

(a) The purpose of the proposed standard;

(b) An explanation of how the proposed standard was derived;

(c) Scientific and technical data and studies supporting the proposed standard or references thereto if the materials are published or otherwise readily available; and

(d) Such other information as may be reasonably required to set forth fully the basis of the standard.

Where the notice of the proposed rulemaking summarizes the full statement of basis and purpose, or incorporates documents by reference, the documents thus summarized or incorporated by reference shall thereupon be made available by the Agency for inspection and copying by any interested person.

§ 104.5 Docket and record.

Whenever the Administrator publishes a notice of hearing under this part, the hearing clerk shall promptly establish a docket for the hearing. The docket shall include all written objections filed by any party, any public comments received pursuant to § 104.3(d), a verbatim transcript of the hearing, the statement of basis and purpose required by § 104.4, and any supporting documents referred to therein, and other documents of exhibits that may be received in evidence or marked for identification by or at the direction of the Presiding Officer, or filed by any party in connection with the hearing. Copies of documents in the docket shall be available to any person upon payment to the Agency of such charges as the Agency may prescribe to cover the costs of duplication. The materials contained in the docket shall constitute the record.

§ 104.6 Designation of Presiding Officer.

The Chief Administrative Law Judge of the Agency may preside personally at any hearing under this part, or he may designate another Administrative Law Judge as Presiding Officer for the hearing. In the event of the unavailability of any such Administrative Law Judge, the Administrator may designate a Presiding Officer. No person who has any personal pecuniary interest in the outcome of a proceeding under this part, or who has participated in the development or enforcement of any standard or proposed standard at issue in a proceeding hereunder, shall serve as Presiding Officer in such proceeding.

§ 104.7 Powers of Presiding Officer.

The Presiding Officer shall have the duty to conduct a fair hearing within the time constraints imposed by section 307(a) of the Act. He shall take all necessary action to avoid delay and to maintain order. He shall have all powers necessary to these ends, including but not limited to the power to:

(a) Rule upon motions and requests;

(b) Change the time and place of the hearing, and adjourn the hearing from time to time or from place to place;

(c) Examine and cross-examine witnesses;

(d) Admit or exclude evidence; and

(e) Require any part or all of the evidence to be submitted in writing and by a certain date.

§ 104.8 Prehearing conferences.

Prehearing conferences are encouraged for the purposes of simplification of issues, identification and scheduling of evidence and witnesses, the establishment of an orderly framework for the proceedings, the expediting of the hearing, and such other purposes of a similar nature as may be appropriate.

(a) The Presiding Officer on his own motion may, and at the request of any party made within 20 days of the proposal of standards hereunder shall, direct all parties to appear at a specified time and place for an initial hearing session in the nature of a prehearing conference. Matters taken up at the conference may include, without limitation:

(1) Consideration and simplification of any issues of law or fact;

(2) Identification, advance submission, marking for identification, consideration of any objections to admission, and admission of documentary evidence;

(3) Possible stipulations of fact;

(4) The identification of each witness expected to be called by each party, and the nature and substance of his expected testimony;

(5) Scheduling of witnesses where practicable, and limitation of the number of witnesses where appropriate in order to avoid delay or repetition;

(6) If desirable, the segregation of the hearing into separate segments for different provisions of the proposed effluent standards and the establishment of separate service lists;

(7) Encouragement of objecting parties to agree upon and designate lead counsel for objectors with common interests so as to avoid repetitious questioning of witnesses.

(b) The Presiding Officer may, following a prehearing conference, issue an order setting forth the agreements reached by the parties or representatives, the schedule of witnesses, and a statement of issues for the hearing. In addition such order may direct the parties to file and serve copies of documents or materials, file and serve lists of witnesses which may include a short summary of the expected testimony of each and, in the case of an expert witness, his curriculum vitae, and may contain such other directions as may be appropriate to facilitate the proceedings.

§ 104.9 Admission of evidence.

(a) Where the Presiding Officer has directed identification of witnesses and production of documentation evidence by a certain date, the Presiding Officer may exclude any such evidence, or refuse to allow any witness to testify, when the witness was not identified or the document was not served by the time set by the Presiding Officer. Any such direction with respect to a party's case in chief shall not preclude the use of such evidence or testimony on rebuttal or response, or upon a showing satisfactory to the Presiding Officer that good cause existed for failure to serve testimony or a document or identify a witness by the time required. The Presiding Officer may require direct testimony to be in writing under oath and served by a certain date, and may exclude testimony not so served.

(b) At the first prehearing conference, or at another time before the beginning of the taking of oral testimony to be set by the Presiding Officer, the statement of basis and purpose, together with any publications or reference materials cited therein, except where excluded by stipulation, shall be received in evidence.

(c) The Presiding Officer may exclude evidence which is immaterial, irrelevant, unduly repetitious or cumulative, or would involve undue delay, or which, if hearsay, is not of the sort upon which responsible persons are accustomed to rely.

(d) If relevant and material evidence is contained in a report or document containing immaterial or irrelevant matter, such immaterial or irrelevant matter may be excluded.

(e) Whenever written testimony or a document or object is excluded from evidence by the Presiding Officer, it shall at the request of the proponent be marked for identification. Where oral testimony is permitted by the Presiding Officer, but the Presiding Officer excludes particular oral testimony, the party offering such testimony may make a brief offer of proof.

(f) Any relevant and material documentary evidence, including but not limited to affidavits, published articles, and official documents, regardless of the availability of the affiant or author for cross-examination, may be admitted in evidence, subject to the provisions of paragraphs (a), (c), and (d) of this section. The availability or nonavailability of cross-examination shall be considered as affecting the weight to be accorded such evidence in any decision based upon the record.

(g) Official notice may be taken by the Presiding Officer or the Administrator of any matter which could be judicially noticed in the United States District Courts, and of other facts within the specialized knowledge and experience of the Agency. Opposing parties shall be given adequate opportunity to show the contrary.

§ 104.10 Hearing procedures.

(a) Following the admission in evidence of the materials described in § 104.9(b), the Agency shall have the right at the commencement of the hearing to supplement that evidence or to introduce additional relevant evidence. Thereafter the evidence of each objector shall be presented in support of its objection and any proposed modification. The Agency staff shall then be given an opportunity to rebut or respond to the objectors' presentation, including at its option the introduction of evidence which tends to support a standard or standards other than as set forth in the Agency's own initially proposed standards. In the event that evidence which tends to support such other standard or standards is offered and received in evidence, then the objectors may thereafter rebut or respond to any such new evidence.

(b) The burden of proof as to any modification of any standard proposed by the Agency shall be upon the party who advocates such modification to show that the proposed modification is justified based upon a preponderance of the evidence.

(c) Where necessary in order to prevent undue prolongation of the hearing, or to comply with time limitations set forth in the Act, the Presiding Officer may limit the number of witnesses who may testify, and the scope and extent of cross-examination.

(d) A verbatim transcript of the hearing shall be maintained and shall constitute a part of the record.

(e) If a party objects to the admission or rejection of any evidence or to any other ruling of the Presiding Officer during the hearing, he shall state briefly the grounds of such objection. With respect to any ruling on evidence, it shall not be necessary for any party to claim an exception in order to preserve any right of subsequent review.

(f) Any party may at any time withdraw his objection to a proposed effluent standard.

§ 104.11 Briefs and findings of fact.

At the conclusion of the hearing, the Presiding Officer shall set a schedule for the submission by the parties of briefs and proposed findings of fact and conclusions. In establishing the aforesaid time schedule, the Presiding Officer shall consider the time constraints placed upon the parties and the Administrator by the statutory deadlines.

§ 104.12 Certification of record.

As soon as possible after the hearing, the Presiding Officer shall transmit to the hearing clerk the transcript of the testimony and exhibits introduced in the hearing. The Presiding Officer shall attach to the original transcript his certificate stating that, to the best of his knowledge and belief, the transcript is a true transcript of the testimony given at the hearing except in such particulars as he shall specify, and that the exhibits transmitted are all the exhibits as introduced at the hearing with such exceptions as he shall specify.

§ 104.13 Interlocutory and post-hearing review of rulings of the Presiding Officer; motions.

(a) The Presiding Officer may certify a ruling for interlocutory review by the Administrator where a party so requests and the Presiding Officer concludes that (1) the ruling from which review is sought involves an important question as to which there is substantial ground for difference of opinion, and (2) either (i) a subsequent reversal of his ruling would be likely to result in substantial delay or expense if left to the conclusion of the proceedings, or (ii) a ruling on the question by the Administrator would be of material assistance in expediting the hearing. The certificate shall be in writing and shall specify the material relevant to the ruling certified. If the Administrator determines that interlocutory review is not warranted, he may decline to consider the ruling which has been certified.

(b) Where the Presiding Officer declines to certify a ruling the party who had requested certification may apply to the Administrator for interlocutory review, or the Administrator may on his own motion direct that any matter be submitted to him for review, subject to the standards for review set forth in paragraph (a) of this section. An application for review shall be in writing and shall briefly state the grounds relied on. If the Administrator takes no action with respect to such application for interlocutory review within 15 days of its filing, such application shall be deemed to have been denied.

(c) Unless otherwise ordered by the Presiding Officer or the Administrator, the hearing shall continue pending consideration by the Administrator of any ruling or request for interlocutory review.

(d) Unless otherwise ordered by the Presiding Officer or the Administrator, briefs in response to any application for interlocutory review may be filed by any party within five days of the filing of the application for review.

(e) Failure to request or obtain interlocutory review does not waive the rights of any party to complain of a ruling following completion of the hearing. Within five days following the close of a hearing under this part, any party may apply to the Administrator for post-hearing review of any procedural ruling, or any ruling made by the Presiding Officer concerning the admission or exclusion of evidence to which timely objection was made. Within seven days following the filing of any such application any other party may file a brief in response thereto.

(f) If the Administrator on review under paragraph (e) of this section determines that evidence was improperly excluded, he may order its admission without remand for further proceedings, or may remand with such instructions as he deems appropriate concerning cross-examination, or opportunity for any party to submit further evidence, with respect to such evidence as he directs should be admitted. In making his determination whether to remand, the Administrator shall consider whether the statutory time restraints permit a remand, and whether it would be constructive to allow cross-examination or further evidence with respect to the newly admitted evidence. If evidence is admitted without cross-examination, the Administrator shall consider the lack of opportunity for cross-examination in determining the weight to be given such evidence.

(g) Motions shall be brief, in writing, and may be filed at any time following the publication of the proposed effluent standards, unless otherwise ordered by the Presiding Officer or the Administrator. Unless otherwise ordered or provided in these rules, responses to motions may be filed within seven days of the actual filing of the motion with the hearing clerk.

§ 104.14 Tentative and final decision by the Administrator.

(a) As soon as practicable following the certification of the record and the filing by the parties of briefs and proposed findings of fact and conclusions under § 104.11, the Administrator, with such staff assistance as he deems necessary and appropriate, shall review the entire record and prepare and file a tentative decision based thereon. The tentative decision shall include findings of fact and conclusions, and shall be filed with the hearing clerk who shall at once transmit a copy thereof to each party who participated at the hearing, or his attorney or other representative.

(b) Upon filing of the tentative decision, the Administrator may allow a reasonable time for the parties to file with him any exceptions to the tenative decision, a brief in support of such exceptions containing appropriate references to the record, and any proposed changes in the tentative decision. Such materials shall, upon submission, become part of the record. As soon as practicable after the filing thereof the Administrator shall prepare and file a final decision, copies of which shall be transmitted to the parties or their representatives in the manner prescribed in paragraph (a) of this section.

(c) In the event that the Administrator determines that due and timely execution of his functions, including compliance with time limitations established by law, imperatively and unavoidably so requires, he may omit the preparation and filing of the tentative decision and related procedures set forth in paragraph (b) of this section, and shall instead prepare and file a final decision, copies of which shall be transmitted to the parties or their representatives in the manner prescribed in paragraph (a) of this section.

(d) Any decision rendered by the Administrator pursuant to this section shall include a statement of his findings and conclusions, and the reasons and basis therefor, and shall indicate the toxic pollutant effluent standard or standards which the Administrator is promulgating or intends to promulgate based thereon.

§ 104.15 Promulgation of standards.

Upon consideration of the record, at the time of his final decision the Administrator shall determine whether the proposed effluent standard or standards should be promulgated as proposed, or whether any modification thereof is justified based upon a preponderance of the evidence adduced at the hearing, regardless of whether or not such modification was actually proposed by any objecting party. If he determines that a modification is not justified, he shall promulgate the standard or standards as proposed. If he determines that a modification is justified, he shall promulgate a standard or standards as so modified.

§ 104.16 Filing and time.

(a) All documents or papers required or authorized by the foregoing provisions of this part including, but not limited to, motions, applications for review, and briefs, shall be filed in duplicate with the hearing clerk, except as otherwise expressly provided in these rules. Any document or paper so required or authorized to be filed with the hearing clerk, if it is filed during the course of the hearing, shall be also filed with the Presiding Officer. A copy of each document or paper filed by any party with the Presiding Officer, with the hearing clerk, or with the Administrator shall be served upon all other parties, except to the extent that the list of parties to be so served may be modified by order of the Presiding Officer, and each such document or paper shall be accompanied by a certificate of such service.

(b) A party may be represented in any proceeding under this part by an attorney or other authorized representative. When any document or paper is required under these rules to be served upon a party such service shall be made upon such attorney or other representative.

(c) Except where these rules or an order of the Presiding Officer require receipt of a document by a certain date, any document or paper required or authorized to be filed by this part shall be deemed to be filed when postmarked, or in the case of papers delivered other than by mail, when received by the hearing clerk.

(d) Sundays and legal holidays shall be included in computing the time allowed for the filing of any document or paper, provided, that when such time expires on a Sunday or legal holiday, such period shall be extended to include the next following business day.

PART 108—EMPLOYEE PROTECTION HEARINGS

Sec.
108.1 Applicability.
108.2 Definitions.
108.3 Request for investigation.
108.4 Investigation by Regional Administrator.
108.5 Procedure.
108.6 Recommendations.
108.7 Hearing before Administrator.

AUTHORITY: Sec. 507(e), Pub. L. 92-500, 86 Stat. 816 (33 U.S.C. 1251 et seq.).

SOURCE: 39 FR 15398, May 3, 1974, unless otherwise noted.

§ 108.1 Applicability.

This part shall be applicable to investigations and hearings required by section 507(e) of the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq. (Pub. L. 92-500).

§ 108.2 Definitions.

As used in this part, the term:

(a) "Act" means the Federal Water Pollution Control Act, as amended;

(b) "Effluent limitation" means any effluent limitation which is established as a condition of a permit issued or proposed to be issued by a State or by the Environmental Protection Agency pursuant to section 402 of the Act; any toxic or pretreatment effluent standard established under section 307 of the Act; any standard of performance established under section 306 of the Act; and any effluent limitation established under section 302, section 316, or section 318 of the Act.

(c) "Order" means any order issued by the Administrator under section 309 of the Act; any order issued by a State to secure compliance with a permit, or condition thereof, issued under a program approved pursuant to section 402 of the Act; or any order issued by a court in an action brought pursuant to section 309 or section 505 of the Act.

(d) "Party" means an employee filing a request under § 108.3, any employee similarly situated, the employer of any such employee, and the Regional Administrator or his designee.

(e) "Administrator" or "Regional Administrator" means the Administrator or a Regional Administrator of the Environmental Protection Agency.

§ 108.3 Request for investigation.

Any employee who is discharged or laid-off, threatened with discharge or lay-off, or otherwise discriminated against by any person because of the alleged results of any effluent limitation or order issued under the Act, or any representative of such employee, may submit a request for an investigation under this part to the Regional Administrator of the region in which such discrimination is alleged to have occurred.

§ 108.4 Investigation by Regional Administrator.

Upon receipt of any request meeting the requirements of § 108.3, the Regional Administrator shall conduct a full investigation of the matter, in order to determine whether the request may be related to an effluent limitation or order under the Act. Following the investigation, the Regional Administrator shall notify the employee requesting the investigation (or the employee's representative) and the employer of such employee, in writing, of his preliminary findings and conclusions. The employee, the representative of such employee, or the employer may within fifteen days following receipt of the preliminary findings and conclusions of the Regional Administrator request a hearing under this part. Upon receipt of such a request, the Regional Administrator, with the concurrence of the Chief Administrative Law Judge, shall publish notice of a hearing to be held not less than 30 days following the date of such publication where he determines that there are factual issues concerning the existence of the alleged discrimination or its relationship to an effluent limitation or order under the Act. The notice shall specify a date before which any party (or representative of such party) may submit a request to appear.

§ 108.5 Procedure.

Any hearing held pursuant to this part shall be of record and shall be conducted according to the requirements of 5 U.S.C. 554. The Administrative Law Judge shall conduct the hearing in an orderly and expeditious manner. By agreement of the parties, he may dismiss the hearing. The Administrative Law Judge, on his own motion, or at the request of any party, shall have the power to hold prehearing conferences, to issue subpoenas for the attendance and testimony of witnesses and the production of relevant papers, books, and documents, and he may administer oaths. The Regional Administrator, and any party submitting a request pursuant to § 108.3 or § 108.4, or counsel or other representative of such party or the Regional Administrator, may appear and offer evidence at the hearing.

§ 108.6 Recommendations.

At the conclusion of any hearing under this part, the Administrative Law Judge shall, based on the record, issue tentative findings of fact and recommendations concerning the alleged discrimination, and shall submit such tentative findings and recommendations to the Administrator. The Administrator shall adopt or modify the findings and recommendations of the Administrative Law Judge, and shall make copies of such findings and recommendations available to the complaining employee, the employer, and the public.

§ 108.7 Hearing before Administrator.

At his option, the Administrator may exercise any powers of an Administrative Law Judge with respect to hearings under this part.

PART 109—CRITERIA FOR STATE, LOCAL AND REGIONAL OIL REMOVAL CONTINGENCY PLANS

Sec.
109.1 Applicability.
109.2 Definitions.
109.3 Purpose and scope.
109.4 Relationship to Federal response actions.
109.5 Development and implementation criteria for State, local and regional oil removal contingency plans.
109.6 Coordination.

AUTHORITY: Sec. 11(j)(1)(B), 84 Stat. 96, 33 U.S.C. 1161(j)(1)(B).

SOURCE: 36 FR 22485, Nov. 25, 1971, unless otherwise noted.

§ 109.1 Applicability.

The criteria in this part are provided to assist State, local and regional agencies in the development of oil removal contingency plans for the inland navigable waters of the United States and all areas other than the high seas, coastal and contiguous zone waters, coastal and Great Lakes ports and harbors and such other areas as may be agreed upon between the Environmental Protection Agency and the Department of Transportation in accordance with section 11(j)(1)(B) of the Federal Act, Executive Order No. 11548 dated July 20, 1970 (35 FR 11677) and § 306.2 of the National Oil and Hazardous Materials Pollution Contingency Plan (35 FR 8511).

§ 109.2 Definitions.

As used in these guidelines, the following terms shall have the meaning indicated below:

(a) "Oil" means oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil.

(b) "Discharge" includes, but is not limited to, any spilling, leaking, pumping, pouring, emitting, emptying, or dumping.

(c) "Remove" or "removal" refers to the removal of the oil from the water and shorelines or the taking of such other actions as may be necessary to minimize or mitigate damage to the public health or welfare, including, but not limited to, fish, shellfish, wildlife, and public and private property, shorelines, and beaches.

(d) "Major disaster" means any hurricane, tornado, storm, flood, high water, wind-driven water, tidal wave, earthquake, drought, fire, or other catastrophe in any part of the United States which, in the determination of the President, is or threatens to become of sufficient severity and magnitude to warrant disaster assistance by the Federal Government to supplement the efforts and available resources of States and local governments and relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby.

(e) "United States" means the States, the District of Columbia, the Commonwealth of Puerto Rico, the Canal Zone, Guam, American Samoa, the Virgin Islands, and the Trust Territory of the Pacific Islands.

(f) "Federal Act" means the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1151, et seq.

§ 109.3 Purpose and scope.

The guidelines in this part establish minimum criteria for the development and implementation of State, local, and regional contingency plans by State and local governments in consultation with private interests to insure timely, efficient, coordinated and effective action to minimize damage resulting from oil discharges. Such plans will be directed toward the protection of the public health or welfare of the United States, including, but not limited to, fish, shellfish, wildlife, and public and private property, shorelines, and beaches. The development and implementation of such plans shall be consistent with the National Oil and Hazardous Materials Pollution Contingency Plan. State, local and regional oil removal contingency plans shall provide for the coordination of the total response to an oil discharge so that contingency organizations established thereunder can function independently, in conjunction with each other, or in conjunction with the National and Regional Response Teams established by the National Oil and Hazardous Materials Pollution Contingency Plan.

§ 109.4 Relationship to Federal response actions.

The National Oil and Hazardous Materials Pollution Contingency Plan provides that the Federal on-scene commander shall investigate all reported spills. If such investigation shows that appropriate action is being taken by either the discharger or non-Federal entities, the Federal on-scene commander shall monitor and provide advice or assistance, as required. If appropriate containment or cleanup action is not being taken by the discharger or non-Federal entities, the Federal on-scene commander will take control of the response activity in accordance with section 11(c)(1) of the Federal Act.

§ 109.5 Development and implementation criteria for State, local and regional oil removal contingency plans.

Criteria for the development and implementation of State, local and regional oil removal contingency plans are:

(a) Definition of the authorities, responsibilities and duties of all persons, organizations or agencies which are to be involved or could be involved in planning or directing oil removal operations, with particular care to clearly define the authorities, responsibilities and duties of State and local governmental agencies to avoid unnecessary duplication of contingency planning activities and to minimize the potential for conflict and confusion that could be generated in an emergency situation as a result of such duplications.

(b) Establishment of notification procedures for the purpose of early detection and timely notification of an oil discharge including:

(1) The identification of critical water use areas to facilitate the reporting of and response to oil discharges.

(2) A current list of names, telephone numbers and addresses of the responsible persons and alternates on call to receive notification of an oil discharge as well as the names, telephone numbers and addresses of the organizations and agencies to be notified when an oil discharge is discovered.

(3) Provisions for access to a reliable communications system for timely notification of an oil discharge and incorporation in the communications system of the capability for interconnection with the communications systems established under related oil removal contingency plans, particularly State and National plans.

(4) An established, prearranged procedure for requesting assistance during a major disaster or when the situation exceeds the response capability of the State, local or regional authority.

(c) Provisions to assure that full resource capability is known and can be committed during an oil discharge situation including:

(1) The identification and inventory of applicable equipment, materials and supplies which are available locally and regionally.

(2) An estimate of the equipment, materials and supplies which would be required to remove the maximum oil discharge to be anticipated.

(3) Development of agreements and arrangements in advance of an oil discharge for the acquisition of equipment, materials and supplies to be used in responding to such a discharge.

(d) Provisions for well defined and specific actions to be taken after discovery and notification of an oil discharge including:

(1) Specification of an oil discharge response operating team consisting of trained, prepared and available operating personnel.

(2) Predesignation of a properly qualified oil discharge response coordinator who is charged with the responsibility and delegated commensurate authority for directing and coordinating response operations and who knows how to request assistance from Federal authorities operating under existing national and regional contingency plans.

(3) A preplanned location for an oil discharge response operations center and a reliable communications system for directing the coordinated overall response operations.

(4) Provisions for varying degrees of response effort depending on the severity of the oil discharge.

(5) Specification of the order of priority in which the various water uses are to be protected where more than one water use may be adversely affected as a result of an oil discharge and where response operations may not be adequate to protect all uses.

(e) Specific and well defined procedures to facilitate recovery of damages and enforcement measures as provided for by State and local statutes and ordinances.

§ 109.6 Coordination.

For the purposes of coordination, the contingency plans of State and local governments should be developed and implemented in consultation with private interests. A copy of any oil removal contingency plan developed by State and local governments should be forwarded to the Council on Environmental Quality upon request to facilitate the coordination of these contingency plans with the National Oil and Hazardous Materials Pollution Contingency Plan.

PART 110—DISCHARGE OF OIL

Sec.
110.1 Definitions.
110.2 Applicability.
110.3 Discharge into navigable waters of such quantities as may be harmful.
110.4 Discharge into contiguous zone of such quantities as may be harmful.
110.5 Discharge beyond contiguous zone of such quantities as may be harmful.
110.6 Discharge prohibited.
110.7 Exception for vessel engines.
110.8 Dispersants.
110.9 Demonstration projects.
110.10 Notice.
110.11 Discharge at deepwater ports.

AUTHORITY: Secs. 311 (b)(3) and (b)(4) and 501(a), Federal Water Pollution Control Act, as amended (33 U.S.C. 1321 (b)(3) and (b)(4) and 1361(a)); sec. 18(m)(3) of the Deepwater Port Act of 1974 (33 U.S.C. 1517(m)(3)); E.O. 11735, 38 FR 21243, 3 CFR Parts 1971-1975 Comp., p. 793.

SOURCE: 52 FR 10719, Apr. 2, 1987, unless otherwise noted.

§ 110.1 Definitions.

As used in this part, the following terms shall have the meaning indicated below:

"Act" means the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq., also known as the Clean Water Act;

"Administrator" means the Administrator of the Environmental Protection Agency (EPA);

"Applicable water quality standards" means State water quality standards adopted by the State pursuant to section 303 of the Act or promulgated by EPA pursuant to that section;

"Contiguous zone" means the entire zone established or to be established by the United States under article 24 of the Convention on the Territorial Sea and the Contiguous Zone;

"Deepwater port" means an offshore facility as defined in section (3)(10) of the Deepwater Port Act of 1974 (33 U.S.C. 1502(10));

"Discharge," when used in relation to section 311 of the Act, includes, but is not limited to, any spilling, leaking, pumping, pouring, emitting, emptying, or dumping, but excludes (A) discharges in compliance with a permit under section 402 of the Act, (B) discharges resulting from circumstances identified and reviewed and made a part of the public record with respect to a permit issued or modified under section 402 of the Act, and subject to a condition in such permit, and (C) continuous or anticipated intermittent discharges from a point source, identified in a permit or permit application under section 402 of the Act, that are caused by events occurring within the scope of relevant operating or treatment systems;

"MARPOL 73/78" means the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, Annex I, which regulates pollution from oil and which entered into force on October 2, 1983;

"Navigable waters" means the waters of the United States, including the territorial seas. The term includes:

(a) All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide;

(b) Interstate waters, including interstate wetlands;

(c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, and wetlands, the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:

(1) That are or could be used by interstate or foreign travelers for recreational or other purposes;

(2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce;

(3) That are used or could be used for industrial purposes by industries in interstate commerce;

(d) All impoundments of waters otherwise defined as navigable waters under this section;

(e) Tributaries of waters identified in paragraphs (a) through (d) of this section, including adjacent wetlands; and

(f) Wetlands adjacent to waters identified in paragraphs (a) through (e) of this section: Provided, That waste treatment systems (other than cooling ponds meeting the criteria of this paragraph) are not waters of the United States;

"NPDES" means National Pollutant Discharge Elimination System;

"Offshore facility" means any facility of any kind located in, on, or under any of the navigable waters of the United States, and any facility of any kind that is subject to the jurisdiction of the United States and is located in, on, or under any other waters, other than a vessel or a public vessel;

"Oil", when used in relation to section 311 of the Act, means oil of any kind or in any form, including, but not limted to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil. "Oil," when used in relation to section 18(m)(3) of the Deepwater Port Act of 1974, has the meaning provided in section 3(14) of the Deepwater Port Act of 1974;

"Onshore facility" means any facility (including, but not limited to, motor vehicles and rolling stock) of any kind located in, on, or under any land within the United States, other than submerged land;

"Person" includes an individual, firm, corporation, association, and a partnership;

"Public vessel" means a vessel owned or bareboat chartered and operated by the United States, or by a State or political subdivision thereof, or by a foreign nation, except when such vessel is engaged in commerce;

"Sheen" means an iridescent appearance on the surface of water;

"Sludge" means an aggregate of oil or oil and other matter of any kind in any form other than dredged spoil having a combined specific gravity equivalent to or greater than water;

"United States" means the States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the Virgin Islands, and the Trust Territory of the Pacific Islands;

"Vessel" means every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water other than a public vessel; and

"Wetlands" means those areas that are inundated or saturated by surface or ground water at a frequency or duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include playa lakes, swamps, marshes, bogs and similar areas such as sloughs, prairie potholes, wet meadows, prairie river overflows, mudflats, and natural ponds.

§ 110.2 Applicability.

The regulations of this part apply to the discharge of oil prohibited by section 311(b)(3) of the Act. This includes certain discharges into or upon the navigable waters of the United States or adjoining shorelines or into or upon the waters of the contiguous zone, or in connection with activities under the Outer Continental Shelf Lands Act or the Deepwater Port Act of 1974, or that may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the United States (including resources under the Magnuson Fishery Conservation and Management Act). The regulations of this part also define the term "discharge" for purposes of section 18(m)(3) of the Deepwater Port Act of 1974, as provided under § 110.11 of this part.

§ 110.3 Discharge into navigable waters of such quantities as may be harmful.

For purposes of section 311(b) of the Act, discharges of oil into or upon the navigable waters of the United States or adjoining shorelines in such quantities that it has been determined may be harmful to the public health or welfare of the United States, except as provided in § 110.7 of this part, include discharges of oil that:

(a) Violate applicable water quality standards, or

(b) Cause a film or sheen upon or discoloration of the surface of the water or adjoining shorelines or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.

§ 110.4 Discharge into contiguous zone of such quantities as may be harmful.

For purposes of section 311(b) of the Act, discharges of oil into or upon the waters of the contiguous zone in such quantities that it has been determined may be harmful to the public health or welfare of the United States, except as provided in § 110.7, include discharges of oil that:

(a) Violate applicable water quality standards, or

(b) Cause a film or sheen upon or discoloration of the surface of the water or adjoining shorelines or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.

§ 110.5 Discharge beyond contiguous zone of such quantities as may be harmful.

For purposes of section 311(b) of the Act, discharges of oil into or upon waters seaward of the contiguous zone in connection with activities under the Outer Continental Shelf Lands Act or the Deepwater Port Act of 1974, or that may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the United States (including resources under the Magnuson Fishery Conservation and Management Act) in such quantities that it has been determined may be harmful to the public health or welfare of the United States, except as provided in § 110.7, include discharges of oil that:

(a) Violate applicable water quality standards, or

(b) Cause a film or sheen upon or discoloration of the surface of the water or adjoining shorelines or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.

§ 110.6 Discharge prohibited.

As provided in section 311(b)(3) of the Act, no person shall discharge or cause or permit to be discharged into or upon the navigable waters of the United States or adjoining shorelines or into or upon the waters of the contiguous zone or into or upon waters seaward of the contiguous zone in connection with activities under the Outer Continental Shelf Lands Act or the Deepwater Port Act of 1974, or that may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the United States (including resources under the Magnuson Fishery Conservation and Management Act) any oil in such quantities as may be harmful as determined in §§ 110.3, 110.4, and 110.5, except as the same may be permitted in the contiguous zone and seaward under MARPOL 73/78, Annex I, as provided in 33 CFR 151.09.

§ 110.7 Exception for vessel engines.

For purposes of section 311(b) of the Act, discharges of oil from a properly functioning vessel engine are not deemed to be harmful, but discharges of such oil accumulated in a vessel's bilges shall not be so exempt.

§ 110.8 Dispersants.

Addition of dispersants or emulsifiers to oil to be discharged that would circumvent the provisions of this part is prohibited.

§ 110.9 Demonstration projects.

Notwithstanding any other provisions of this part, the Administrator may permit the discharge of oil, under section 311 of the Act, in connection with research, demonstration projects, or studies relating to the prevention, control, or abatement of oil pollution.

§ 110.10 Notice.

Any person in charge of a vessel or of an onshore or offshore facility shall, as soon as he or she has knowledge of any discharge of oil from such vessel or facility in violation of § 110.6, immediately notify the National Response Center (NRC) (800-424-8802; in the Washington, DC metropolitan area, 426-2675). If direct reporting to the NRC is not practicable, reports may be made to the Coast Guard or EPA predesignated On-Scene Coordinator (OSC) for the geographic area where the discharge occurs. All such reports shall be promptly relayed to the NRC. If it is not possible to notify the NRC or the predesignated OCS immediately, reports may be made immediately to the nearest Coast Guard unit, provided that the person in charge of the vessel or onshore or offshore facility notifies the NRC as soon as possible. The reports shall be made in accordance with such procedures as the Secretary of Transportation may prescribe. The procedures for such notice are set forth in U.S. Coast Guard regulations, 33 CFR Part 153, Subpart B and in the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300, Subpart E. (Approved by the Office of Management and Budget under the control number 2050-0046)

§ 110.11 Discharge at deepwater ports.

(a) Except as provided in paragraph (b) below, for purposes of section 18(m)(3) of the Deepwater Port Act of 1974, the term "discharge" shall include but not be limited to, any spilling, leaking, pumping, pouring, emitting, emptying, or dumping into the marine environment of quantities of oil that:

(1) Violate applicable water quality standards, or

(2) Cause a film or sheen upon or discoloration of the surface of the water or adjoining shorelines or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.

(b) For purposes of section 18(m)(3) of the Deepwater Port Act of 1974, the term "discharge" excludes:

(1) Discharges of oil from a properly functioning vessel engine, (including an engine on a public vessel), but not discharges of such oil accumulated in a vessel's bilges (unless in compliance with MARPOL 73/78, Annex I); and

(2) Discharges of oil permitted under MARPOL 73/78, Annex I.

PART 112—OIL POLLUTION PREVENTION

Sec.

112.1 General applicability.
112.2 Definitions.
112.3 Requirements for preparation and implementation of Spill Prevention Control and Countermeasure Plans.
112.4 Amendment of SPCC Plans by Regional Administrator.
112.5 Amendment of Spill Prevention Control and Countermeasure Plans by owners or operators.
112.6 Civil penalties for violation of oil pollution prevention regulations.
112.7 Guidelines for the preparation and implementation of a Spill Prevention Control and Countermeasure Plan.

APPENDIX—MEMORANDUM OF UNDERSTANDING BETWEEN THE SECRETARY OF TRANSPORTATION AND THE ADMINISTRATOR OF THE ENVIRONMENTAL PROTECTION AGENCY

AUTHORITY: Secs. 311(j)(1)(C), 311(j)(2), 501(a), Federal Water Pollution Control Act (sec. 2, Pub. L. 92-500, 86 Stat. 816 et seq. (33 U.S.C. 1251 et seq.)); sec. 4(b), Pub. L. 92-500, 86 Stat. 897; 5 U.S.C. Reorg. Plan of 1970 No. 3 (1970), 35 FR 15623, 3 CFR 1966-1970 Comp.; E.O. 11735, 38 FR 21243, 3 CFR.

SOURCE: 38 FR 34165, Dec. 11, 1973, unless otherwise noted.

§ 112.1 General applicability.

(a) This part establishes procedures, methods and equipment and other requirements for equipment to prevent the discharge of oil from non-transportation-related onshore and offshore facilities into or upon the navigable waters of the United States or adjoining shorelines.

(b) Except as provided in paragraph (d) of this section, this part applies to owners or operators of non-transportation-related onshore and offshore facilities engaged in drilling, producing, gathering, storing, processing, refining, transferring, distributing or consuming oil and oil products, and which, due to their location, could reasonably be expected to discharge oil in harmful quantities, as defined in Part 110 of this chapter, into or upon the navigable waters of the United States or adjoining shorelines.

(c) As provided in section 313 (86 Stat. 875) departments, agencies, and instrumentalities of the Federal government are subject to these regulations to the same extent as any person, except for the provisions of § 112.6.

(d) This part does not apply to:

(1) Facilities, equipment or operations which are not subject to the jurisdiction of the Environmental Protection Agency, as follows:

(i) Onshore and offshore facilities, which, due to their location, could not reasonably be expected to discharge oil into or upon the navigable waters of the United States or adjoining shorelines. This determination shall be based solely upon a consideration of the geographical, locational aspects of the facility (such as proximity to navigable waters or adjoining shorelines, land contour, drainage, etc.) and shall exclude consideration of manmade features such as dikes, equipment or other structures which may serve to restrain, hinder, contain, or otherwise prevent a discharge of oil from reaching navigable waters of the United States or adjoining shorelines; and

(ii) Equipment or operations of vessels or transportation-related onshore and offshore facilities which are subject to authority and control of the Department of Transportation, as defined in the Memorandum of Understanding between the Secretary of Transportation and the Administrator of the Environmental Protection Agency, dated November 24, 1971, 36 FR 24000.

(2) Those facilities which, although otherwise subject to the jurisdiction of the Environmental Protection Agency, meet both of the following requirements:

(i) The underground buried storage capacity of the facility is 42,000 gallons or less of oil, and

(ii) The storage capacity, which is not buried, of the facility is 1,320 gallons or less of oil, provided no single container has a capacity in excess of 660 gallons.

(e) This part provides for the preparation and implementation of Spill Prevention Control and Countermeasure Plans prepared in accordance with § 112.7, designed to complement existing laws, regulations, rules, standards, policies and procedures pertaining to safety standards, fire prevention and pollution prevention rules, so as to form a comprehensive balanced Federal/State spill prevention program to minimize the potential for oil discharges. Compliance with this part does not in any way relieve the owner or operator of an onshore or an offshore facility from compliance with other Federal, State or local laws.

[38 FR 34165, Dec. 11, 1973, as amended at 41 FR 12657, Mar. 26, 1976]

§ 112.2 Definitions.

For the purposes of this part:

(a) "Oil" means oil of any kind or in any form, including, but not limited to petroleum, fuel oil, sludge, oil refuse and oil mixed with wastes other than dredged spoil.

(b) "Discharge" includes but is not limited to, any spilling, leaking, pumping, pouring, emitting, emptying or dumping. For purposes of this part, the term "discharge" shall not include any discharge of oil which is authorized by a permit issued pursuant to section 13 of the River and Harbor Act of 1899 (30 Stat. 1121, 33 U.S.C. 407), or sections 402 or 405 of the FWPCA Amendments of 1972 (86 Stat. 816 et seq., 33 U.S.C. 1251 et seq.).

(c) "Onshore facility" means any facility of any kind located in, on, or under any land within the United States, other than submerged lands, which is not a transportation-related facility.

(d) "Offshore facility" means any facility of any kind located in, on, or under any of the navigable waters of the United States, which is not a transportation-related facility.

(e) "Owner or operator" means any person owning or operating an onshore facility or an offshore facility, and in the case of any abandoned offshore facility, the person who owned or operated such facility immediately prior to such abandonment.

(f) "Person" includes an individual, firm, corporation, association, and a partnership.

(g) "Regional Administrator", means the Regional Administrator of the Environmental Protection Agency, or his designee, in and for the Region in which the facility is located.

(h) "Transportation-related" and "non-transportation-related" as applied to an onshore or offshore facility, are defined in the Memorandum of Understanding between the Secretary of Transportation and the Administrator of the Environmental Protection Agency, dated November 24, 1971, 36 FR 24080.

(i) "Spill event" means a discharge of oil into or upon the navigable waters of the United States or adjoining shorelines in harmful quantities, as defined at 40 CFR Part 110.

(j) "United States" means the States, the District of Columbia, the Commonwealth of Puerto Rico, the Canal Zone, Guam, American Samoa, the Virgin Islands, and the Trust Territory of the Pacific Islands.

(k) The term "navigable waters" of the United States means "navigable waters" as defined in section 502(7) of the FWPCA, and includes:

(1) All navigable waters of the United States, as defined in judicial decisions prior to passage of the 1972 Amendments to the FWPCA (Pub. L. 92-500), and tributaries of such waters;

(2) Interstate waters;

(3) Intrastate lakes, rivers, and streams which are utilized by interstate travelers for recreational or other purposes; and

(4) Intrastate lakes, rivers, and streams from which fish or shellfish are taken and sold in interstate commerce.

(l) "Vessel" means every description of watercraft or other artificial contrivance used, or capable of being used as a means of transportation on water, other than a public vessel.

§ 112.3 Requirements for preparation and implementation of Spill Prevention Control and Countermeasure Plans.

(a) Owners or operators of onshore and offshore facilities in operation on or before the effective date of this part that have discharged or, due to their location, could reasonably be expected to discharge oil in harmful quantities, as defined in 40 CFR Part 110, into or upon the navigable waters of the United States or adjoining shorelines, shall prepare a Spill Prevention Control and Countermeasure Plan (hereinafter "SPCC Plan"), in writing and in accordance with § 112.7. Except as provided for in paragraph (f) of this section, such SPCC Plan shall be prepared within six months after the effective date of this part and shall be fully implemented as soon as possible, but not later than one year after the effective date of this part.

(b) Owners or operators of onshore and offshore facilities that become operational after the effective date of this part, and that have discharged or could reasonably be expected to discharge oil in harmful quantities, as defined in 40 CFR Part 110, into or upon the navigable waters of the United States or adjoining shorelines, shall prepare an SPCC Plan in accordance with § 112.7. Except as provided for in paragraph (f) of this section, such SPCC Plan shall be prepared within six months after the date such facility begins operations and shall be fully implemented as soon as possible, but not later than one year after such facility begins operations.

(c) Owners or operators of onshore and offshore mobile or portable facilities, such as onshore drilling or workover rigs, barge mounted offshore drilling or workover rigs, and portable fueling facilities shall prepare and implement an SPCC Plan as required by paragraphs (a), (b) and (d) of this section. The owners or operators of such facility need not prepare a new SPCC Plan each time the facility is moved to a new site. The SPCC Plan may be a general plan, prepared in accordance with § 112.7, using good engineering practice. When the mobile or portable facility is moved, it must be located and installed using the spill prevention practices outlined in the SPCC Plan for the facility. No mobile or portable facility subject to this regulation shall operate unless the SPCC Plan has been implemented. The SPCC Plan shall only apply while the facility is in a fixed (non-transportation) operating mode.

(d) No SPCC Plan shall be effective to satisfy the requirements of this part unless it has been reviewed by a Registered Professional Engineer and certified to by such Professional Engineer. By means of this certification the engineer, having examined the facility and being familiar with the provisions of this part, shall attest that the SPCC Plan has been prepared in accordance with good engineering practices. Such certification shall in no way relieve the owner or operator of an onshore or offshore facility of his duty to prepare and fully implement such Plan in accordance with § 112.7, as required by paragraphs (a), (b) and (c) of this section.

(e) Owners or operators of a facility for which an SPCC Plan is required pursuant to paragraph (a), (b) or (c) of this section shall maintain a complete copy of the Plan at such facility if the facility is normally attended at least 8 hours per day, or at the nearest field office if the facility is not so attended, and shall make such Plan available to the Regional Administrator for on-site review during normal working hours.

(f) Extensions of time.

(1) The Regional Administrator may authorize an extension of time for the preparation and full implementation of an SPCC Plan beyond the time permitted for the preparation and implementation of an SPCC Plan pursuant to paragraph (a), (b) or (c) of this section where he finds that the owner or operator of a facility subject to paragraphs (a), (b) or (c) of this section cannot fully comply with the requirements of this part as a result of either nonavailability of qualified personnel, or delays in construction or equipment delivery beyond the control and without the fault of such owner or operator or their respective agents or employees.

(2) Any owner or operator seeking an extension of time pursuant to paragraph (f)(1) of this section may submit a letter of request to the Regional Administrator. Such letter shall include:

(i) A complete copy of the SPCC Plan, if completed;

(ii) A full explanation of the cause for any such delay and the specific aspects of the SPCC Plan affected by the delay;

(iii) A full discussion of actions being taken or contemplated to minimize or mitigate such delay;

(iv) A proposed time schedule for the implementation of any corrective actions being taken or contemplated, including interim dates for completion of tests or studies, installation and operation of any necessary equipment or other preventive measures.

In addition, such owner or operator may present additional oral or written statements in support of his letter of request.

(3) The submission of a letter of request for extension of time pursuant to paragraph (f)(2) of this section shall in no way relieve the owner or operator from his obligation to comply with the requirements of § 112.3 (a), (b) or (c). Where an extension of time is authorized by the Regional Administrator for particular equipment or other specific aspects of the SPCC Plan, such extension shall in no way affect the owner's or operator's obligation to comply with the requirements of § 112.3 (a), (b) or (c) with respect to other equipment or other specific aspects of the SPCC Plan for which an extension of time has not been expressly authorized.

[38 FR 34165, Dec. 11, 1973, as amended at 41 FR 12657, Mar. 26, 1976]

§ 112.4 Amendment of SPCC Plans by Regional Administrator.

(a) Notwithstanding compliance with § 112.3, whenever a facility subject to § 112.3 (a), (b) or (c) has: Discharged more than 1,000 U.S. gallons of oil into or upon the navigable waters of the United States or adjoining shorelines in a single spill event, or discharged oil in harmful quantities, as defined in 40 CFR Part 110, into or upon the navigable waters of the United States or adjoining shorelines in two spill events, reportable under section 311(b)(5) of the FWPCA, occurring within any twelve month period, the owner or operator of such facility shall submit to the Regional Administrator, within 60 days from the time such facility becomes subject to this section, the following:

(1) Name of the facility;

(2) Name(s) of the owner or operator of the facility;

(3) Location of the facility;

(4) Date and year of initial facility operation;

(5) Maximum storage or handling capacity of the facility and normal daily throughput;

(6) Description of the facility, including maps, flow diagrams, and topographical maps;

(7) A complete copy of the SPCC Plan with any amendments;

(8) The cause(s) of such spill, including a failure analysis of system or subsystem in which the failure occurred;

(9) The corrective actions and/or countermeasures taken, including an adequate description of equipment repairs and/or replacements;

(10) Additional preventive measures taken or contemplated to minimize the possibility of recurrence;

(11) Such other information as the Regional Administrator may reasonably require pertinent to the Plan or spill event.

(b) Section 112.4 shall not apply until the expiration of the time permitted for the preparation and implementation of an SPCC Plan pursuant to § 112.3 (a), (b), (c) and (f).

(c) A complete copy of all information provided to the Regional Administrator pursuant to paragraph (a) of this section shall be sent at the same time to the State agency in charge of water pollution control activities in and for the State in which the facility is located. Upon receipt of such information such State agency may conduct a review and make recommendations to the Regional Administrator as to further procedures, methods, equipment and other requirements for equipment necessary to prevent and to contain discharges of oil from such facility.

(d) After review of the SPCC Plan for a facility subject to paragraph (a) of this section, together with all other information submitted by the owner or operator of such facility, and by the State agency under paragraph (c) of this section, the Regional Administrator may require the owner or operator of such facility to amend the SPCC Plan if he finds that the Plan does not meet the requirements of this part or that the amendment of the Plan is necessary to prevent and to contain discharges of oil from such facility.

(e) When the Regional Administrator proposes to require an amendment to the SPCC Plan, he shall notify the facility operator by certified mail addressed to, or by personal delivery to, the facility owner or operator, that he proposes to require an amendment to the Plan, and shall specify the terms of such amendment. If the facility owner or operator is a corporation, a copy of such notice shall also be mailed to the registered agent, if any, of such corporation in the State where such facility is located. Within 30 days from receipt of such notice, the facility owner or operator may submit written information, views, and arguments on the amendment. After considering all relevant material presented, the Regional Administrator shall notify the facility owner or operator of any amendment required or shall rescind the notice. The amendment required by the Regional Administrator shall become part of the Plan 30 days after such notice, unless the Regional Administrator, for good cause, shall specify another effective date. The owner or operator of the facility shall implement the amendment of the Plan as soon as possible, but not later than six months after the amendment becomes part of the Plan, unless the Regional Administrator specifies another date.

(f) An owner or operator may appeal a decision made by the Regional Administrator requiring an amendment to an SPCC Plan. The appeal shall be made to the Administrator of the United States Environmental Protection Agency and must be made in writing within 30 days of receipt of the notice from the Regional Administrator requiring the amendment. A complete copy of the appeal must be sent to the Regional Administrator at the time the appeal is made. The appeal shall contain a clear and concise statement of the issues and points of fact in the case. It may also contain additional information from the owner or operator, or from any other person. The Administrator or his designee may request additional information from the owner or operator, or from any other person. The Administrator or his designee shall render a decision within 60 days of receiving the appeal and shall notify the owner or operator of his decision.

[38 FR 34165, Dec. 11, 1973, as amended at 41 FR 12658, Mar. 26, 1976]

§ 112.5 Amendment of Spill Prevention Control and Countermeasure Plans by owners or operators.

(a) Owners or operators of facilities subject to § 112.3 (a), (b) or (c) shall amend the SPCC Plan for such facility in accordance with § 112.7 whenever there is a change in facility design, construction, operation or maintenance which materially affects the facility's potential for the discharge of oil into or upon the navigable waters of the United States or adjoining shore lines. Such amendments shall be fully implemented as soon as possible, but not later than six months after such change occurs.

(b) Notwithstanding compliance with paragraph (a) of this section, owners and operators of facilities subject to § 112.3 (a), (b) or (c) shall complete a review and evaluation of the SPCC Plan at least once every three years from the date such facility becomes subject to this part. As a result of this review and evaluation, the owner or operator shall amend the SPCC Plan within six months of the review to include more effective prevention and control technology if: (1) Such technology will significantly reduce the likelihood of a spill event from the facility, and (2) if such technology has been field-proven at the time of the review.

(c) No amendment to an SPCC Plan shall be effective to satisfy the requirements of this section unless it has been certified by a Professional Engineer in accordance with § 112.3(d).

§ 112.6 Civil penalties for violation of oil pollution prevention regulations.

Owners or operators of facilities subject to § 112.3 (a), (b) or (c) who violate the requirements of this Part 112 by failing or refusing to comply with any of the provisions of § 112.3, § 112.4 or § 112.5 shall be liable for a civil penalty of not more than $5,000 for each day such violation continues. Civil penalties shall be imposed in accordance with procedures set out in Part 114 of this Subchapter D.

(Secs. 311(j), 501(a), Pub. L. 92-500, 86 Stat. 868, 885 (33 U.S.C. 1321(j), 1361(a)))

[39 FR 31602, Aug. 29, 1974]

§ 112.7 Guidelines for the preparation and implementation of a Spill Prevention Control and Countermeasure Plan.

The SPCC Plan shall be a carefully thought-out plan, prepared in accordance with good engineering practices, and which has the full approval of management at a level with authority to commit the necessary resources. If the plan calls for additional facilities or procedures, methods, or equipment not yet fully operational, these items should be discussed in separate paragraphs, and the details of installation and operational start-up should be explained separately. The complete SPCC Plan shall follow the sequence outlined below, and include a discussion of the facility's conformance with the appropriate guidelines listed:

(a) A facility which has experienced one or more spill events within twelve months prior to the effective date of this part should include a written description of each such spill, corrective action taken and plans for preventing recurrence.

(b) Where experience indicates a reasonable potential for equipment failure (such as tank overflow, rupture, or leakage), the plan should include a prediction of the direction, rate of flow, and total quantity of oil which could be discharged from the facility as a result of each major type of failure.

(c) Appropriate containment and/or diversionary structures or equipment to prevent discharged oil from reaching a navigable water course should be provided. One of the following preventive systems or its equivalent should be used as a minimum:

(1) Onshore facilities:

(i) Dikes, berms or retaining walls sufficiently impervious to contain spilled oil;

(ii) Curbing;

(iii) Culverting, gutters or other drainage systems;

(iv) Weirs, booms or other barriers;

(v) Spill diversion ponds;

(vi) Retention ponds;

(vii) Sorbent materials.

(2) Offshore facilities:

(i) Curbing, drip pans;

(ii) Sumps and collection systems.

(d) When it is determined that the installation of structures or equipment listed in § 112.7(c) to prevent discharged oil from reaching the navigable waters is not practicable from any onshore or offshore facility, the owner or operator should clearly demonstrate such impracticability and provide the following:

(1) A strong oil spill contingency plan following the provision of 40 CFR Part 109.

(2) A written commitment of manpower, equipment and materials required to expeditiously control and remove any harmful quantity of oil discharged.

(e) In addition to the minimal prevention standards listed under § 112.7(c), sections of the Plan should include a complete discussion of conformance with the following applicable guidelines, other effective spill prevention and containment procedures (or, if more stringent, with State rules, regulations and guidelines):

(1) *Facility drainage (onshore); (excluding production facilities).* (i) Drainage from diked storage areas should be restrained by valves or other positive means to prevent a spill or other excessive leakage of oil into the drainage system or inplant effluent treatment system, except where plan systems are designed to handle such leakage. Diked areas may be emptied by pumps or ejectors; however, these should be manually activated and the condition of the accumulation should be examined before starting to be sure no oil will be discharged into the water.

(ii) Flapper-type drain valves should not be used to drain diked areas. Valves used for the drainage of diked areas should, as far as practical, be of manual, open-and-closed design. When plant drainage drains directly into water courses and not into wastewater treatment plants, retained storm water should be inspected as provided in paragraphs (e)(2)(iii) (B), (C) and (D) of this section before drainage.

(iii) Plant drainage systems from undiked areas should, if possible, flow into ponds, lagoons or catchment basins, designed to retain oil or return it to the facility. Catchment basin should not be located in areas subjec to periodic flooding.

(iv) If plant drainage is not engi neered as above, the final discharge o all in-plant ditches should be equippe with a diversion system that could, i the event of an uncontrolled spill return the oil to the plant.

(v) Where drainage waters are treat ed in more than one treatment unit natural hydraulic flow should be used If pump transfer is needed, two "lift pumps should be provided, and at leas one of the pumps should be perma nently installed when such treatmen is continuous. In any event, whateve techniques are used facility drainag systems should be adequately engi neered to prevent oil from reachin navigable waters in the event of equip ment failure or human error at the fa cility.

(2) *Bulk storage tanks (onshore); (ex cluding production facilities).* (i) N tank should be used for the storage o oil unless its material and constructio are compatible with the materia stored and conditions of storage suc as pressure and temperature, etc.

(ii) All bulk storage tank installa tions should be constructed so that secondary means of containment i provided for the entire contents of th largest single tank plus sufficient free board to allow for precipitation. Dike areas should be sufficiently imperv ous to contain spilled oil. Dikes, con tainment curbs, and pits are common ly employed for this purpose, but the may not always be appropriate. An al ternative system could consist of complete drainage trench enclosur arranged so that a spill could termi nate and be safely confined in an in plant catchment basin or holdin pond.

(iii) Drainage of rainwater from th diked area into a storm drain or an ef fluent discharge that empties into a open water course, lake, or pond, an bypassing the in-plant treatmen system may be acceptable if:

(A) The bypass valve is normall sealed closed.

(B) Inspection of the run-off rai water ensures compliance with appli cable water quality standards and wi not cause a harmful discharge as defined in 40 CFR Part 110.

(C) The bypass valve is opened, and resealed following drainage under responsible supervision.

(D) Adequate records are kept of such events.

(iv) Buried metallic storage tanks represent a potential for undetected spills. A new buried installation should be protected from corrosion by coatings, cathodic protection or other effective methods compatible with local soil conditions. Such buried tanks should at least be subjected to regular pressure testing.

(v) Partially buried metallic tanks for the storage of oil should be avoided, unless the buried section of the shell is adequately coated, since partial burial in damp earth can cause rapid corrosion of metallic surfaces, especially at the earth/air interface.

(vi) Aboveground tanks should be subject to periodic integrity testing, taking into account tank design (floating roof, etc.) and using such techniques as hydrostatic testing, visual inspection or a system of non-destructive shell thickness testing. Comparison records should be kept where appropriate, and tank supports and foundations should be included in these inspections. In addition, the outside of the tank should frequently be observed by operating personnel for signs of deterioration, leaks which might cause a spill, or accumulation of oil inside diked areas.

(vii) To control leakage through defective internal heating coils, the following factors should be considered and applied, as appropriate.

(A) The steam return or exhaust lines from internal heating coils which discharge into an open water course should be monitored for contamination, or passed through a settling tank, skimmer, or other separation or retention system.

(B) The feasibility of installing an external heating system should also be considered.

(viii) New and old tank installations should, as far as practical, be fail-safe engineered or updated into a fail-safe engineered installation to avoid spills. Consideration should be given to providing one or more of the following devices:

(A) High liquid level alarms with an audible or visual signal at a constantly manned operation or surveillance station; in smaller plants an audible air vent may suffice.

(B) Considering size and complexity of the facility, high liquid level pump cutoff devices set to stop flow at a predetermined tank content level.

(C) Direct audible or code signal communication between the tank gauger and the pumping station.

(D) A fast response system for determining the liquid level of each bulk storage tank such as digital computers, telepulse, or direct vision gauges or their equivalent.

(E) Liquid level sensing devices should be regularly tested to insure proper operation.

(ix) Plant effluents which are discharged into navigable waters should have disposal facilities observed frequently enough to detect possible system upsets that could cause an oil spill event.

(x) Visible oil leaks which result in a loss of oil from tank seams, gaskets, rivets and bolts sufficiently large to cause the accumulation of oil in diked areas should be promptly corrected.

(xi) Mobile or portable oil storage tanks (onshore) should be positioned or located so as to prevent spilled oil from reaching navigable waters. A secondary means of containment, such as dikes or catchment basins, should be furnished for the largest single compartment or tank. These facilities should be located where they will not be subject to periodic flooding or washout.

(3) *Facility transfer operations, pumping, and in-plant process (onshore); (excluding production facilities).* (i) Buried piping installations should have a protective wrapping and coating and should be cathodically protected if soil conditions warrant. If a section of buried line is exposed for any reason, it should be carefully examined for deterioration. If corrosion damage is found, additional examination and corrective action should be taken as indicated by the magnitude of the damage. An alternative would

be the more frequent use of exposed pipe corridors or galleries.

(ii) When a pipeline is not in service, or in standby service for an extended time the terminal connection at the transfer point should be capped or blank-flanged, and marked as to origin.

(iii) Pipe supports should be properly designed to minimize abrasion and corrosion and allow for expansion and contraction.

(iv) All aboveground valves and pipelines should be subjected to regular examinations by operating personnel at which time the general condition of items, such as flange joints, expansion joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces should be assessed. In addition, periodic pressure testing may be warranted for piping in areas where facility drainage is such that a failure might lead to a spill event.

(v) Vehicular traffic granted entry into the facility should be warned verbally or by appropriate signs to be sure that the vehicle, because of its size, will not endanger above ground piping.

(4) *Facility tank car and tank truck loading/unloading rack (onshore).* (i) Tank car and tank truck loading/unloading procedures should meet the minimum requirements and regulation established by the Department of Transportation.

(ii) Where rack area drainage does not flow into a catchment basin or treatment facility designed to handle spills, a quick drainage system should be used for tank truck loading and unloading areas. The containment system should be designed to hold at least maximum capacity of any single compartment of a tank car or tank truck loaded or unloaded in the plant.

(iii) An interlocked warning light or physical barrier system, or warning signs, should be provided in loading/unloading areas to prevent vehicular departure before complete disconnect of flexible or fixed transfer lines.

(iv) Prior to filling and departure of any tank car or tank truck, the lowermost drain and all outlets of such vehicles should be closely examined for leakage, and if necessary, tightened, adjusted, or replaced to prevent liquid leakage while in transit.

(5) *Oil production facilities (onshore)*—(i) *Definition.* An onshore production facility may include all wells, flowlines, separation equipment, storage facilities, gathering lines, and auxiliary non-transportation-related equipment and facilities in a single geographical oil or gas field operated by a single operator.

(ii) *Oil production facility (onshore) drainage.* (A) At tank batteries and central treating stations where an accidental discharge of oil would have a reasonable possibility of reaching navigable waters, the dikes or equivalent required under § 112.7(c)(1) should have drains closed and sealed at all times except when rainwater is being drained. Prior to drainage, the diked area should be inspected as provided in paragraphs (e)(2)(iii) (B), (C), and (D) of this section. Accumulated oil on the rainwater should be picked up and returned to storage or disposed of in accordance with approved methods.

(B) Field drainage ditches, road ditches, and oil traps, sumps or skimmers, if such exist, should be inspected at regularly scheduled intervals for accumulation of oil that may have escaped from small leaks. Any such accumulations should be removed.

(iii) *Oil production facility (onshore) bulk storage tanks.* (A) No tank should be used for the storage of oil unless its material and construction are compatible with the material stored and the conditions of storage.

(B) All tank battery and central treating plant installations should be provided with a secondary means of containment for the entire contents of the largest single tank if feasible, or alternate systems such as those outlined in § 112.7(c)(1). Drainage from undiked areas should be safely confined in a catchment basin or holding pond.

(C) All tanks containing oil should be visually examined by a competent person for condition and need for maintenance on a scheduled periodic basis. Such examination should include the foundation and supports of tanks that are above the surface of the ground.

(D) New and old tank battery installations should, as far as practical, be fail-safe engineered or updated into a fail-safe engineered installation to prevent spills. Consideration should be given to one or more of the following:

(*1*) Adequate tank capacity to assure that a tank will not overfill should a pumper/gauger be delayed in making his regular rounds.

(*2*) Overflow equalizing lines between tanks so that a full tank can overflow to an adjacent tank.

(*3*) Adequate vacuum protection to prevent tank collapse during a pipeline run.

(*4*) High level sensors to generate and transmit an alarm signal to the computer where facilities are a part of a computer production control system.

(iv) *Facility transfer operations, oil production facility* (*onshore*). (A) All above ground valves and pipelines should be examined periodically on a scheduled basis for general condition of items such as flange joints, valve glands and bodies, drip pans, pipeline supports, pumping well polish rod stuffing boxes, bleeder and gauge valves.

(B) Salt water (oil field brine) disposal facilities should be exained often, particularly following a sudden change in atmospheric temperature to detect possible system upsets that could cause an oil discharge.

(C) Production facilities should have a program of flowline maintenance to prevent spills from this source. The program should include periodic examinations, corrosion protection, flowline replacement, and adequate records, as appropriate, for the individual facility.

(6) *Oil drilling and workover facilities* (*onshore*). (i) Mobile drilling or workover equipment should be positioned or located so as to prevent spilled oil from reaching navigable waters.

(ii) Depending on the location, catchment basins or diversion structures may be necessary to intercept and contain spills of fuel, crude oil, or oily drilling fluids.

(iii) Before drilling below any casing string or during workover operations, a blowout prevention (BOP) assembly and well control system should be installed that is capable of controlling any well head pressure that is expected to be encountered while that BOP assembly is on the well. Casing and BOP installations should be in accordance with State regulatory agency requirements.

(7) *Oil drilling, production, or workover facilities* (*offshore*). (i) Definition: "An oil drilling, production or workover facility (offshore)" may include all drilling or workover equipment, wells, flowlines, gathering lines, platforms, and auxiliary nontransportation-related equipment and facilities in a single geographical oil or gas field operated by a single operator.

(ii) Oil drainage collection equipment should be used to prevent and control small oil spillage around pumps, glands, valves, flanges, expansion joints, hoses, drain lines, separators, treaters, tanks, and allied equipment. Drains on the facility should be controlled and directed toward a central collection sump or equivalent collection system sufficient to prevent discharges of oil into the navigable waters of the United States. Where drains and sumps are not practicable oil contained in collection equipment should be removed as often as necessary to prevent overflow.

(iii) For facilities employing a sump system, sump and drains should be adequately sized and a spare pump or equivalent method should be available to remove liquid from the sump and assure that oil does not escape. A regular scheduled preventive maintenance inspection and testing program should be employed to assure reliable operation of the liquid removal system and pump start-up device. Redundant automatic sump pumps and control devices may be required on some installations.

(iv) In areas where separators and treaters are equipped with dump valves whose predominant mode of failure is in the closed position and pollution risk is high, the facility should be specially equipped to prevent the escape of oil. This could be accomplished by extending the flare line to a diked area if the separator is near shore, equipping it with a high liquid level sensor that will automatically shut-in wells producing to the separator, parallel redundant dump valves, or other feasible alternatives to prevent oil discharges.

(v) Atmospheric storage or surge tanks should be equipped with high liquid level sensing devices or other acceptable alternatives to prevent oil discharges.

(vi) Pressure tanks should be equipped with high and low pressure sensing devices to activate an alarm and/or control the flow or other acceptable alternatives to prevent oil discharges.

(vii) Tanks should be equipped with suitable corrosion protection.

(viii) A written procedure for inspecting and testing pollution prevention equipment and systems should be prepared and maintained at the facility. Such procedures should be included as part of the SPCC Plan.

(ix) Testing and inspection of the pollution prevention equipment and systems at the facility should be conducted by the owner or operator on a scheduled periodic basis commensurate with the complexity, conditions and circumstances of the facility or other appropriate regulations.

(x) Surface and subsurface well shut-in valves and devices in use at the facility should be sufficiently described to determine method of activation or control, e.g., pressure differential, change in fluid or flow conditions, combination of pressure and flow, manual or remote control mechanisms. Detailed records for each well, while not necessarily part of the plan should be kept by the owner or operator.

(xi) Before drilling below any casing string, and during workover operations a blowout preventer (BOP) assembly and well control system should be installed that is capable of controlling any well-head pressure that is expected to be encountered while that BOP assembly is on the well. Casing and BOP installations should be in accordance with State regulatory agency requirements.

(xii) Extraordinary well control measures should be provided should emergency conditions, including fire, loss of control and other abnormal conditions, occur. The degree of control system redundancy should vary with hazard exposure and probable consequences of failure. It is recommended that surface shut-in systems have redundant or "fail close" valving. Subsurface safety valves may not be needed in producing wells that will not flow but should be installed as required by applicable State regulations.

(xiii) In order that there will be no misunderstanding of joint and separate duties and obligations to perform work in a safe and pollution free manner, written instructions should be prepared by the owner or operator for contractors and subcontractors to follow whenever contract activities include servicing a well or systems appurtenant to a well or pressure vessel. Such instructions and procedures should be maintained at the offshore production facility. Under certain circumstances and conditions such contractor activities may require the presence at the facility of an authorized representative of the owner or operator who would intervene when necessary to prevent a spill event.

(xiv) All manifolds (headers) should be equipped with check valves on individual flowlines.

(xv) If the shut-in well pressure is greater than the working pressure of the flowline and manifold valves up to and including the header valves associated with that individual flowline, the flowline should be equipped with a high pressure sensing device and shut-in valve at the wellhead unless provided with a pressure relief system to prevent over pressuring.

(xvi) All pipelines appurtenant to the facility should be protected from corrosion. Methods used, such as protective coatings or cathodic protection, should be discussed.

(xvii) Sub-marine pipelines appurtenant to the facility should be adequately protected against environmental stresses and other activities such as fishing operations.

(xviii) Sub-marine pipelines appurtenant to the facility should be in good operating condition at all times and inspected on a scheduled periodic basis for failures. Such inspections should be documented and maintained at the facility.

(8) *Inspections and records.* Inspections required by this part should be

in accordance with written procedures developed for the facility by the owner or operator. These written procedures and a record of the inspections, signed by the appropriate supervisor or inspector, should be made part of the SPCC Plan and maintained for a period of three years.

(9) *Security (excluding oil production facilities).* (i) All plants handling, processing, and storing oil should be fully fenced, and entrance gates should be locked and/or guarded when the plant is not in production or is unattended.

(ii) The master flow and drain valves and any other valves that will permit direct outward flow of the tank's content to the surface should be securely locked in the closed position when in non-operating or non-standby status.

(iii) The starter control on all oil pumps should be locked in the "off" position or located at a site accessible only to authorized personnel when the pumps are in a non-operating or non-standby status.

(iv) The loading/unloading connections of oil pipelines should be securely capped or blank-flanged when not in service or standby service for an extended time. This security practice should also apply to pipelines that are emptied of liquid content either by draining or by inert gas pressure.

(v) Facility lighting should be commensurate with the type and location of the facility. Consideration should be given to: (A) Discovery of spills occurring during hours of darkness, both by operating personnel, if present, and by non-operating personnel (the general public, local police, etc.) and (B) prevention of spills occurring through acts of vandalism.

(10) *Personnel, training and spill prevention procedures.* (i) Owners or operators are responsible for properly instructing their personnel in the operation and maintenance of equipment to prevent the discharges of oil and applicable pollution control laws, rules and regulations.

(ii) Each applicable facility should have a designated person who is accountable for oil spill prevention and who reports to line management.

(iii) Owners or operators should schedule and conduct spill prevention briefings for their operating personnel at intervals frequent enough to assure adequate understanding of the SPCC Plan for that facility. Such briefings should highlight and describe known spill events or failures, malfunctioning components, and recently developed precautionary measures.

APPENDIX—MEMORANDUM OF UNDERSTANDING BETWEEN THE SECRETARY OF TRANSPORTATION AND THE ADMINISTRATOR OF THE ENVIRONMENTAL PROTECTION AGENCY

SECTION II—DEFINITIONS

The Environmental Protection Agency and the Department of Transportation agree that for the purposes of Executive Order 11548, the term:

(1) "Non-transportation-related onshore and offshore facilities" means:

(A) Fixed onshore and offshore oil well drilling facilities including all equipment and appurtenances related thereto used in drilling operations for exploratory or development wells, but excluding any terminal facility, unit or process integrally associated with the handling or transferring of oil in bulk to or from a vessel.

(B) Mobile onshore and offshore oil well drilling platforms, barges, trucks, or other mobile facilities including all equipment and appurtenances related thereto when such mobile facilities are fixed in position for the purpose of drilling operations for exploratory or development wells, but excluding any terminal facility, unit or process integrally associated with the handling or transferring of oil in bulk to or from a vessel.

(C) Fixed onshore and offshore oil production structures, platforms, derricks, and rigs including all equipment and appurtenances related thereto, as well as completed wells and the wellhead separators, oil separators, and storage facilities used in the production of oil, but excluding any terminal facility, unit or process integrally associated with the handling or transferring of oil in bulk to or from a vessel.

(D) Mobile onshore and offshore oil production facilities including all equipment and appurtenances related thereto as well as completed wells and wellhead equipment, piping from wellheads to oil separators, oil separators, and storage facilities used in the production of oil when such mobile facilities are fixed in position for the purpose of oil production operations, but excluding any terminal facility, unit or process integrally associated with the handling or transferring of oil in bulk to or from a vessel.

(E) Oil refining facilities including all equipment and appurtenances related thereto as well as in-plant processing units, storage units, piping, drainage systems and waste treatment units used in the refining of oil, but excluding any terminal facility, unit or process integrally associated with the handling or transferring of oil in bulk to or from a vessel.

(F) Oil storage facilities including all equipment and appurtenances related thereto as well as fixed bulk plant storage, terminal oil storage facilities, consumer storage, pumps and drainage systems used in the storage of oil, but excluding inline or breakout storage tanks needed for the continuous operation of a pipeline system and any terminal facility, unit or process integrally associated with the handling or transferring of oil in bulk to or from a vessel.

(G) Industrial, commercial, agricultural or public facilities which use and store oil, but excluding any terminal facility, unit or process integrally associated with the handling or transferring of oil in bulk to or from a vessel.

(H) Waste treatment facilities including in-plant pipelines, effluent discharge lines, and storage tanks, but excluding waste treatment facilities located on vessels and terminal storage tanks and appurtenances for the reception of oily ballast water or tank washings from vessels and associated systems used for off-loading vessels.

(I) Loading racks, transfer hoses, loading arms and other equipment which are appurtenant to a nontransportation-related facility or terminal facility and which are used to transfer oil in bulk to or from highway vehicles or railroad cars.

(J) Highway vehicles and railroad cars which are used for the transport of oil exclusively within the confines of a nontransportation-related facility and which are not intended to transport oil in interstate or intrastate commerce.

(K) Pipeline systems which are used for the transport of oil exclusively within the confines of a nontransportation-related facility or terminal facility and which are not intended to transport oil in interstate or intrastate commerce, but excluding pipeline systems used to transfer oil in bulk to or from a vessel.

(2) "Transportation-related onshore and offshore facilities" means:

(A) Onshore and offshore terminal facilities including transfer hoses, loading arms and other equipment and appurtenances used for the purpose of handling or transferring oil in bulk to or from a vessel as well as storage tanks and appurtenances for the reception of oily ballast water or tank washings from vessels, but excluding terminal waste treatment facilities and terminal oil storage facilities.

(B) Transfer hoses, loading arms and other equipment appurtenant to a nontransportation-related facility which is used to transfer oil in bulk to or from a vessel.

(C) Interstate and intrastate onshore and offshore pipeline systems including pumps and appurtenances related thereto as well as in-line or breakout storage tanks needed for the continuous operation of a pipeline system, and pipelines from onshore and offshore oil production facilities, but excluding onshore and offshore piping from wellheads to oil separators and pipelines which are used for the transport of oil exclusively within the confines of a nontransportation-related facility or terminal facility and which are not intended to transport oil in interstate or intrastate commerce or to transfer oil in bulk to or from a vessel.

(D) Highway vehicles and railroad cars which are used for the transport of oil in interstate or intrastate commerce and the equipment and appurtenances related thereto, and equipment used for the fueling of locomotive units, as well as the rights-of-way on which they operate. Excluded are highway vehicles and railroad cars and motive power used exclusively within the confines of a nontransportation-related facility or terminal facility and which are not intended for use in interstate or intrastate commerce.

PART 113—LIABILITY LIMITS FOR SMALL ONSHORE STORAGE FACILITIES

Subpart A—Oil Storage Facilities

Sec.

113.1 Purpose.
113.2 Applicability.
113.3 Definitions.
113.4 Size classes and associated liability limits for fixed onshore oil storage facilities, 1,000 barrels or less capacity.
113.5 Exclusions.
113.6 Effect on other laws.

AUTHORITY: Sec. 311(f)(2), 86 Stat. 867 (33 U.S.C. 1251 (1972)).

SOURCE: 38 FR 25440, Sept. 13, 1973, unless otherwise noted.

Subpart A—Oil Storage Facilities

§ 113.1 Purpose.

This subpart establishes size classifications and associated liability limits for small onshore oil storage facilities with fixed capacity of 1,000 barrels or less.

§ 113.2 Applicability.

This subpart applies to all onshore oil storage facilities with fixed capacity of 1,000 barrels or less. When a discharge to the waters of the United States occurs from such facilities and when removal of said discharge is performed by the United States Government pursuant to the provisions of subsection 311(c)(1) of the Act, the liability of the owner or operator and the facility will be limited to the amounts specified in § 113.4.

§ 113.3 Definitions.

As used in this subpart, the following terms shall have the meanings indicated below:

(a) "Aboveground" storage facility means a tank or other container, the bottom of which is on a plane not more than 6 inches below the surrounding surface.

(b) "Act" means the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1151, et seq.

(c) "Barrel" means 42 United States gallons at 60 degrees Fahrenheit.

(d) "Belowground" storage facility means a tank or other container located other than as defined as "Aboveground".

(e) "Discharge" includes, but is not limited to any spilling, leaking, pumping, pouring, emitting, emptying or dumping.

(f) "Onshore Oil Storage Facility" means any facility (excluding motor vehicles and rolling stock) of any kind located in, on, or under, any land within the United States, other than submerged land.

(g) "On-Scene Coordinator" is the single Federal representative designated pursuant to the National Oil and Hazardous Substances Pollution Contingency Plan and identified in approved Regional Oil and Hazardous Substances Pollution Contingency Plans.

(h) "Oil" means oil of any kind or in any form, including but no limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil.

(i) "Remove" or "removal" means he removal of the oil from the water and shorelines or the taking of such other actions as the Federal On-Scene Coordinator may determine to be necessary to minimize or mitigate damage to the public health or welfare, including but not limited to, fish, shellfish, wildlife, and public and private property, shorelines, and beaches.

Additionally, the terms not otherwise defined herein shall have the meanings assigned them by section 311(a) of the Act.

§ 113.4 Size classes and associated liability limits for fixed onshore oil storage facilities, 1,000 barrels or less capacity.

Unless the United States can show that oil was discharged as a result of willful negligence or willful misconduct within the privity and knowledge of the owner or operator, the following limits of liability are established for fixed onshore facilities in the classes specified:

(a) Aboveground storage.

Size class	Capacity (barrels)	Limit (dollars)
I	Up to 10	4,000
II	11 to 170	60,000
III	171 to 500	150,000
IV	501 to 1,000	200,000

(b) Belowground storage.

Size class	Capacity (barrels)	Limit (dollars)
I	Up to 10	5,200
II	11 to 170	78,000
III	171 to 500	195,000
IV	501 to 1,000	260,000

§ 113.5 Exclusions.

This subpart does not apply to:

(a) Those facilities whose average daily oil throughout is more than their fixed oil storage capacity.

(b) Vehicles and rolling stock.

§ 113.6 Effect on other laws.

Nothing herein shall be construed to limit the liability of any facility under State or local law or under any Federal law other than section 311 of the Act, nor shall the liability of any facility for any charges or damages under State or local law reduce its liability to the Federal Government under section

311 of the Act, as limited by this subpart.

PART 114—CIVIL PENALTIES FOR VIOLATION OF OIL POLLUTION PREVENTION REGULATIONS

Non-Transportation Related Onshore and Offshore Facilities

Sec.

114.1 General applicability.
114.2 Violation.
114.3 Determination of penalty.
114.4 Notice of Violation.
114.5 Request for hearing.
114.6 Presiding Officer.
114.7 Consolidation.
114.8 Prehearing conference.
114.9 Conduct of hearing.
114.10 Decision.
114.11 Appeal to Administrator.

Authority: Secs. 311(j), 501(a), Pub. L. 92-500, 86 Stat. 868, 885 (33 U.S.C. 1321(j), 1361(a)).

Source: 39 FR 31602, Aug. 29, 1974, unless otherwise noted.

Non-Transportation Related Onshore and Offshore Facilities

§ 114.1 General applicability.

Owners or operators of facilities subject to § 112.3 (a), (b) or (c) of this subchapter who violate the requirements of Part 112 of this Subchapter D by failing or refusing to comply with any of the provisions of § 112.3, 112.4, or 112.5 of this subchapter shall be liable for a civil penalty of not more than $5,000 for each day such violation continues. Civil penalties shall be assessed and compromised in accordance with this part. No penalty shall be assessed until the owner or operator shall have been given notice and an opportunity for hearing in accordance with this part.

§ 114.2 Violation.

Owners or operators of facilities shall be liable for a civil penalty for noncompliance with the requirements of Part 112 of this subchapter, including but not limited to failure to:

(a) Prepare a Spill Prevention Control and Countermeasure (SPCC) plan in accordance with § 112.3 of this subchapter;

(b) Have a SPCC plan certified by Registered Professional Engineer required by § 112.3 of this subchapte

(c) Implement the SPCC plan as r quired by § 112.3 of this subchapter;

(d) Submit information after a sp as required by § 112.4 of this subcha ter;

(e) Amend plan as required § 112.4 of this subchapter;

(f) Implement amendment as r quired by § 112.4 of this subchapter;

(g) Amend plan after change in fac ity design as required by § 112.6 of th subchapter;

(h) Review plan every three years required by § 112.5 of this subchapte

(i) Amend plan after review as r quired by § 112.5; or

(j) Have amendment certified as r quired by § 112.5 of this subchapt and implemented.

§ 114.3 Determination of penalty.

(a) In determining the amount the penalty to be assessed the follo ing factors shall be considered:

(1) Gravity of the violation; and

(2) Demonstrated good faith effor to achieve rapid compliance after no fication of a violation.

(b) The amount of the civil penal to be assessed may be settled by co promise at any stage of the procee ings.

(c) Civil penalties may be assessed the Regional Administrator whe there is no request for a hearing pu suant to § 114.5.

§ 114.4 Notice of Violation.

The Notice of Violation shall be se to the person charged with a violati and shall specify the:

(a) Date of issuance;

(b) Nature of violation, including th law or regulation that he is charg with violating;

(c) Amount of the maximum pen ty;

(d) Amount of the proposed ci penalty;

(e) The right to present written planations, information or any mate als in answer to the charges or in mi gation of the penalty, or bearing the person's efforts to achieve comp ance after notification of the violatio

(f) Manner of the payment of any money which may be paid to the United States;

(g) Right to request a hearing; and

(h) The procedures for requesting a hearing including the right to be represented by counsel.

§ 114.5 Request for hearing.

Within thirty (30) days of the date of receipt of a Notice of Violation, the person named in the Notice may request a hearing by submitting a written request signed by or on behalf of such person by a duly authorized officer, director, agent, or attorney-in-fact, to the Regional Administrator.

(a) Requests for hearings shall:

(1) State the name and address of the person requesting the hearing;

(2) Enclose a copy of the Notice of Violation; and

(3) State with particularity the issues to be raised by such person at the hearing.

(b) After a request for hearing which complies with the requirements of paragraph (a) of this section has been filed, a hearing shall be scheduled for the earliest practicable date.

(c) Extensions of the time for the commencement of the hearing may be granted for good cause shown.

§ 114.6 Presiding Officer.

The hearing shall be conducted by the Presiding Officer. The Regional Administrator may designate any attorney in the Environmental Protection Agency to act as the Presiding Officer. No person shall serve as a Presiding Officer where he has any prior connection with the case including without limitation the performance of investigative or prosecuting functions or any other such functions. The Presiding Officer appointed shall have the full authority to conduct the hearing, decide issues and to assess a civil penalty as appropriate.

§ 114.7 Consolidation.

The Presiding Officer may, in his discretion, order consolidation of any hearings held under this part and arising within one Region whenever he determines that consolidation will expedite or simplify the consideration of the issues presented. The Administrator may, in his discretion, order consolidation, and designate one Region to be responsible for the conduct of any hearings held under this part which arise in different Regions whenever he determines that consolidation will expedite or simplify the consideration of the issues presented. Consolidation shall not affect the right of any person to raise issues that could have been raised if consolidation had not occurred. At the conclusion of the hearing the Presiding Officer shall render a separate decision for each separate civil penalty case.

§ 114.8 Prehearing conference.

The Presiding Officer may hold one or more prehearing conferences and may issue a hearing agenda which may include, without limitation, decisions with regard to any or all the following:

(a) Stipulations and admissions;

(b) Disputed issues of fact;

(c) Hearing procedures including submission of oral or written testimony and the time allotted for oral arguments; and

(d) Any other matter which may expedite the hearing or aid in disposition of any issues raised therein.

§ 114.9 Conduct of hearing.

The hearing shall be held in the general location of the facility where the alleged violation occurred or as agreed to by EPA and the person charged. The Presiding Officer shall have the duty to conduct a fair and impartial hearing, to take action to avoid unnecessary delay in the disposition of proceedings, and to maintain order. The person charged with the violation may offer relevant facts, statements, explanations, and other items which such person feels should be considered in defense to the charges, bearing on the person's efforts to achieve compliance after notification of the violation or which may bear upon the penalty to be assessed. The EPA or other appropriate Agency personnel shall have the opportunity to offer facts, statements, explanations and other items including testimony of other appropriate Agencies personnel in order for the Presiding Officer to be fully informed. In the event the matter cannot be resolved by settlement the person charged with the violation shall be informed in writing, of the decision of the Presiding Officer and shall be advised of his right to appeal.

§ 114.10 Decision.

Within thirty (30) days after the conclusion of the hearings, the Presiding Officer shall issue findings with respect to the matter, including, where appropriate to the amount of the civil penalty. In assessing the civil penalty the Presiding Officer shall consider the factors set forth in § 114.3. A copy of the Presiding Officer's decision shall be sent to the person charged in the Notice of Violation. The decision of the Presiding Officer shall become the final decision of the Environmental Protection Agency unless within fifteen (15) days from the date of receipt of such decision, the person assessed the penalty appeals the decision to the Administrator, or unless the Administrator shall have stayed the effectiveness of the decision pending review.

§ 114.11 Appeal to Administrator.

(a) The person assessed a penalty in the Presiding Officer's determination shall have the right to appeal an adverse decision to the Administrator upon filing a written Notice of Appeal in the form required by paragraph (b) of this section within fifteen (15) days of the date the receipt of the Presiding Officer's decision.

(b) The Notice of Appeal shall:

(1) State the name and address of the person filing the Notice of Appeal;

(2) Contain a concise statement of the facts on which the person relies;

(3) Contain a concise statement of the legal basis on which the person relies; and

(4) Contain a concise statement setting forth the action which the person proposed that the Administrator take.

(c) The Administrator may delegate this authority to act in a given case.

(d) The Administrator, after a Notice of Appeal in proper form has been filed, shall render a decision with respect to the appeal promptly. In rendering his decision, the Administrator may adopt, modify, or set aside the decision of the Presiding Officer in any respect and shall include in his decision a concise statement of the basis therefore. The decision of the Administrator on appeal shall be effective when rendered.

PART 116—DESIGNATION OF HAZARDOUS SUBSTANCES

Sec.
116.1 Applicability.
116.2 Abbreviations.
116.3 Definitions.
116.4 Designation of hazardous substances.

AUTHORITY: Secs. 311(b)(2)(A) and 501(a), Federal Water Pollution Control Act (33 U.S.C. 1251 et seq.).

§ 116.1 Applicability.

This regulation designates hazardous substances under section 311(b)(2)(A) of the Federal Water Pollution Control Act (the Act). The regulation applies to discharges of substances designated in Table 116.4.

[43 FR 10474, Mar. 13, 1978]

§ 116.2 Abbreviations.

ppm=parts per million
mg=milligram(s)
kg=kilogram(s)
mg/l=milligrams(s) per liter=(approx.) ppm
mg/kg=milligram(s) per kilogram=(approx.) ppm

[43 FR 10474, Mar. 13, 1978]

§ 116.3 Definitions.

As used in this part, all terms shall have the meaning defined in the Act and as given below:

"The Act" means the Federal Water Pollution Control Act, as amended by the Federal Water Pollution Control Act Amendments of 1972 (Pub. L. 92-500), and as further amended by the Clean Water Act of 1977 (Pub. L. 95-217), 33 U.S.C. 1251 et seq.; and as further amended by the Clean Water Act Amendments of 1978 (Pub. L. 95-676);

"Discharge" includes, but is not limited to, any spilling, leaking, pumping, pouring, emitting, emptying or dumping, but excludes (A) discharges in compliance with a permit under section 402 of this Act, (B) discharges resulting from circumstances identified and reviewed and made a part of the public record with respect to a permit issued or modified under section 402 of this Act, and subject to a condition in such permit, and (C) continuous or anticipated intermittent discharges from a point source, identified in a permit or permit application under section 402 of this Act, which are caused by events occurring within the scope of relevant operating or treatment systems;

"Otherwise subject to the jurisdiction of the United States" means subject to the jurisdiction of the United States by virtue of United States citizenship, United States vessel documentation or numbering, or as provided for by international agreement to which the United States is a party.

"Vessel" means every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water other than a public vessel;

"Public vessel" means a vessel owned or bareboat-chartered and operated by the United States, or a State or political subdivision thereof, or by a foreign nation, except when such vessel is engaged in commerce.

"Onshore facility" means any facility (including, but not limited to, motor vehicles and rolling stock) of any kind located in, on, or under, any land within the United States other than submerged land;

"Offshore facility" means any facility of any kind located in, on, or under, any of the navigable waters of the United States, and any facility of any kind which is subject to the jurisdiction of the United States and is located in, on, or under any other waters, other than a vessel or a public vessel;

"Navigable waters" is defined in section 502(7) of the Act to mean "waters of the United States, including the territorial seas," and includes, but is not limited to: (1) All waters which are presently used, or were used in the past, or may be susceptible to use as a means to transport interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide, and including adjacent wetlands; the term "wetlands" as used in this regulation shall include those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevelance of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas; the term "adjacent" means bordering, contiguous or neighboring; (2) tributaries of navigable waters of the United States, including adjacent wetlands; (3) interstate waters, including wetlands; and (4) all other waters of the United States such as intrastate lakes, rivers, streams, mudflats, sandflats and wetlands, the use, degradation or destruction of which affect interstate commerce including, but not limited to:

(i) Intrastate lakes, rivers, streams, and wetlands which are utilized by interstate travelers for recreational or other purposes; and

(ii) Intrastate lakes, rivers, streams, and wetlands from which fish or shellfish are or could be taken and sold in interstate commerce; and

(iii) Intrastate lakes, rivers, streams, and wetlands which are utilized for industrial purposes by industries in interstate commerce.

"Contiguous zone" means the entire zone established or to be established by the United States under article 24 of the Convention of the Territorial Sea and the Contiguous Zone;

"Territorial seas" means the belt of the seas measured from the line of ordinary low water along that portion of the coast which is in direct contact with the open sea and the line marking the seaward limit of inland waters, and extending seaward a distance of 3 miles.

A discharge "in connection with activities under the Outer Continental Shelf Lands Act or the Deepwater Port Act of 1974, or which may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the United States (including resources under the Fishery Conservation and Management Act of 1976)," means: (1) A discharge into any waters beyond the contiguous zone from any vessel or onshore or offshore facility, which vessel or facility is subject to or is engaged in activities under the Outer Continental Shelf Lands Act or the Deepwater Port Act of 1974, and (2) any discharge into any waters beyond the contiguous zone which contain, cover, or support any natural resource belonging to, appertaining to, or under the exclusive management authority of the United States (including resources under the Fishery Conservation and Management Act of 1976).

"Aquatic animals" means appropriately sensitive wholly aquatic animals which carry out respiration by means of a gill structure permitting gaseous exchange between the water and the circulatory system;

"Animals" means appropriately sensitive animals which carry out respiration by means of a lung structure permitting gaseous exchange between air and the circulatory system;

"Aquatic flora" means plant life associated with the aquatic eco-system including, but not limited to, algae and higher plants;

"Mixture" means any combination of two or more elements and/or compounds in solid, liquid, or gaseous form except where such substances have undergone a chemical reaction so as to become inseparable by physical means.

"LC50" means that concentration of material which is lethal to one- half of the test population of aquatic animals upon continuous exposure for 96 hours or less.

[43 FR 10474, Mar. 13, 1978; 43 FR 27533, June 26, 1978, as amended at 44 FR 10266, Feb. 16, 1979]

§ 116.4 Designation of hazardous substances.

The elements and compounds appearing in Tables 116.4 A and B are designated as hazardous substances in accordance with section 311(b)(2)(A) of the Act. This designation includes any isomers and hydrates, as well as any solutions and mixtures containing these substances. Synonyms and Chemical Abstract System (CAS) numbers have been added for convenience of the user only. In case of any disparity the common names shall be considered the designated substance.

TABLE 116.4A—LIST OF HAZARDOUS SUBSTANCES

Common name	CAS No.	Synonyms	Isomers	CAS No.
Acetaldehyde	75070	Ethanal, ethyl aldehyde, acetic aldehyde		
Acetic acid	64197	Glacial acetic acid, vinegar acid		
Acetic anhydride	108247	Acetic oxide, acetyl oxide		
Acetone cyanohydrin	75865	2-methyllactonitrile, alpha-hydroxyisobutyronitrile.		
Acetyl bromide	506967			
Acetyl chloride	79367			
Acrolein	107028	2-propenal, acrylic aldehyde, acrylaldehyde, acraldehyde.		
Acrylonitrile	107131	Cyanoethylene, Fumigrain, Ventox, propeneitrile, vinyl cyanide.		
Adipic acid	124049	Hexanedioic acid		
Aldrin	309002	Octalene, HHDN		
Allyl alcohol	107186	2-propen-1-ol, 1-propenol-3, vinyl carbinol		
Allyl chloride	107051	3-chloropropene, 3-chloropropylene, Chlorallylene.		
Aluminum sulfate	10043013	Alum		
Ammonia	7664417			
Ammonium acetate	631618	Acetic acid ammonium, salt		
Ammonium benzoate	1863634			
Ammonium bicarbonate	1066337	Acid ammonium carbonate, ammonium hydrogen carbonate.		
Ammonium bichromate	7789095			
Ammonium bifluoride	1341497	Acid ammonium fluoride, ammonium hydrogen fluoride.		
Ammonium bisulfite	10192300			
Ammonium carbamate	1111780	Ammonium aminoformate		
Ammonium carbonate	506876			
Ammonium chloride	12125029	Ammonium muriate, sal ammoniac, salmiac, Amchlor.		
Ammonium chromate	7788989			

TABLE 116.4A—LIST OF HAZARDOUS SUBSTANCES—Continued

Common name	CAS No.	Synonyms	Isomers	CAS No.
Ammonium citrate dibasic	3012655	Diammonium citrate, citric acid diammonium salt.		
Ammonium fluoborate	13826830	Ammonium fluoroborate, ammonium borofluoride.		
Ammonium fluoride	12125018	Neutral ammonium fluoride		
Ammonium hydroxide	1336216			
Ammonium oxalate	6009707			
	5972736			
	14258492			
Ammonium silicofluoride	16919190	Ammonium fluosilicate		
Ammonium sulfamate	7773060	Ammate, AMS, ammonium amidosulfate		
Ammonium sulfide	12135761			
Ammonium sulfite	10196040			
	10192300			
Ammonium tartrate	3164292	Tartaric acid ammonium salt		
	14307438			
Ammonium thiocyanate	1762954	Ammonium rhodanide, ammonium sulfocyanate, ammonium sulfocyanide.		
Amly acetate	628637	Amylacetic ester	iso-	123922
		Pear oil	sec-	626380
		Banana oil	tert-	625161
Aniline	62533	Aniline oil, phenylamine, aminobenzene, aminophen, kyanol.		
Antimony pentachloride	7647189			
Antimony potassium tartrate	28300745	Tartar emetic, tartrated antimony, tartarized antimony, potassium antimonyltartrate.		
Antimony tribromide	7789619			
Antimony trichloride	10025919	Butter of antimony		
Antimony trifluoride	7783564	Antimony fluoride		
Antimony trioxide	1309644	Diantimony trioxide, flowers of antimony		
Arsenic disulfide	1303328	Red arsenic sulfide		
Arsenic pentoxide	1303282	Arsenic acid anhydride, arsenic oxide		
Arsenic trichloride	7784341	Arsenic chloride, arsenious chloride, arsenous chloride, butter of arsenic.		
Arsenic trioxide	1327533	Arsenious acid, arsenious oxide, white arsenic.		
Arsenic trisulfide	1303339	Arsenious sulfide, yellow arsenic sulfide		
Barium cyanide	542621			
Benzene	71432	Cyclohexatriene, benzol		
Benzoic acid	65850	Benzenecarboxylic acid, phenylformic acid, dracylic acid.		
Benzonitrile	100470	Phenyl cyanide, cyanobenzene		
Benzoyl chloride	98884	Benzenecarbonyl chloride		
Benzyl chloride	100447			
Beryllium chloride	7787475			
Beryllium fluoride	7787497			
Beryllium nitrate	7787555			
	13597994			
Butyl acetate	123864	Acetic acid butyl ester	iso-	110190
			sec-	105464
			tert-	540885
Butylamine	109739	1-aminobutane	iso-	78819
			sec-	513495
			sec-	13952846
			tert-	75649
n/butyl phthalate	84742	1.2-benzenedicarboxylic acid, dibutyl ester, dibutyl phthalate.		
Butyric acid	107926	Butanoic acid, ethylacetic acid	iso-	79312
Cadmium acetate	543908			
Cadmium bromide	7789426			
Cadmium chloride	10108642			
Calcium arsenate	7778441	Tricalcium orthoarsenate		
Calcium arsenite	52740166			
Calcium carbide	75207	Carbide, acetylenogen		
Calcium chromate	13765190	Calcium chrome yellow, geblin, yellow ultramarine.		
Calcium cyanide	592018			
Calcium dodecylbenzenesulfonate	26264062			
Calcium hypochlorite	7778543			
Captan	133062	Orthocide-406, SR-406, Vancide-89		

TABLE 116.4A—LIST OF HAZARDOUS SUBSTANCES—Continued

Common name	CAS No.	Synonyms	Isomers	CAS No.
Carbaryl	63252	Sevin		
Carbofuran	1563662	Furadan		
Carbon disulfide	75150	Carbon bisulfide, dithiocarbonic anhydride		
Carbon tetrachloride	56235	Tetrachloromethane Perchloromethane		
Chlordane	57749	Toxichlor, chlordan		
Chlorine	75003			
Chlorobenzene	108907	Monochlorobenzene, benzene chloride		
Chloroform	67663	Trichloromethane		
Chlorpyrifos	2921882	Dursban		
Chlorosulfonic acid	7790945	Sulfuric chlorohydrin		
Chromic acetate	1066304			
Chromic acid	11115745	Chromic anhydride, chromium trioxide		
Chromic sulfate	10101538			
Chromous chloride	10049055			
Cobaltous bromide	7789437	Cobalt bromide		
Coabaltous formate	544183	Cobalt formate		
Cobaltous sulfamate	14017415	Cobalt sulfamate		
Coumaphos	56724	Co-Ral		
Cresol	1319773	Cresylic acid	m-	1083
		Hydroxytoluene	o-	954
			p-	1064
Crotonaldehyde	4170303	2-butenal propylene aldehyde		
Cupric acetate	142712	Copper acetate, crystalized verdigris		
Cupric acetoarsenite	12002038	Copper acetoarsenite, copper acetate arsenite, Paris green.		
Cupric chloride	7447394	Copper chloride		
Cupric nitrate	3251238	Copper nitrate		
Cupric oxalate	5893663	Copper oxalate		
Cupric sulfate	7758987	Copper sulfate		
Cupric sulfate, ammoniated	10380297	Ammoniated copper sulfate		
Cupric tartrate	815827	Copper tartrate		
Cyanogen chloride	506774			
Cyclohexane	110827	Hexahydrobenzene, hexamethylene, hexanaphthene.		
2,4-D acid	94757	2,4-dichlorophenoxyacetic acid		
2,4-D ester	94111 94791 94804 1320189 1928387 1928616 1929733 2971382 25168267 53467111	2,4-dichlorophenoxyacetic acid ester		
DDT	50293	p,p′-DDT		
Diazinon	333415	Dipofene, Diazitol, Basudin, Spectracide		
Dicamba	1918009	2-methoxy-3,6-dichlorobenzoic acid		
Dichlobenil	1194656	2,6-dichlorobenzonitrile, 2,6-DBN		
Dichlone	117806	Phygon, dichloronaphthoquinone		
Dichlorobenzene	25321226	Di-chloricide	Ortho	955
		Paramoth (Para)	Para	1064
Dichloropropane	26638197	Propylene dichloride	1,1	789
			1,2	7887
			1,3	1422
Dichloropropene	26952238		1,3	5427
			2,3	788
Dichloropropene-dichloropropane (mixture).	8003198	D-D mixture Vidden D		
2,2-Dichloropropionic acid	75990	Dalapon		
Dichlorvos	62737	2,2-dichlorovinyl dimethyl phosphate, Vapona.		
Dicofol	115322	Di(p-chlorophenyl)-trichloromethylcarbinol, DTMC, dicofol.		
Dieldrin	60571	Alvit		
Diethylamine	109897			
Dimethylamine	124403			
Dinitrobenzene (mixed)	25154545	Dinitrobenzol	m-	996
			o-	5262
			p-	1002

TABLE 116.4A—LIST OF HAZARDOUS SUBSTANCES—Continued

Common name	CAS No.	Synonyms	Isomers	CAS No.
Dinitrophenol	51285	Aldifen	(2,5-)	329715
			(2,4-)	
			(2,6-)	573568
Dinitrotoluene	25321146	DNT	2,4	121142
			2,6	606202
			3,4	610399
Diquat	85007	Aquacide		
	2764729	Dextrone, Reglone, Diquat dibromide		
Disulfoton	298044	Di-syston		
Diuron	330541	DCMU, DMU		
Dodecylbenzenesulfonic acid	27176870			
Endosulfan	115297	Thiodan		
Endrin	72208	Mendrin, Compound 269		
Epichlorohydrin	106898	-chloropropylene oxide		
Ethion	563122	Nialate, ethyl methylene, phosphorodithioate.		
Ethylbenzene	100414	Phenylethane		
Ethylenediamine	107153	1,2-diaminoethane		
Ethylenediamine-tetraacetic acid (EDTA).	60004	Edetic acid, Havidote, (ethylenedinitrilo)-tetraacetic acid.		
Ethylene dibromide	106934	1,2-dibromoethane acetylene dibromide sym-dibromoethylene.		
Ethylene dichloride	107062	1,2-dichloroethane sym-bichloroethane		
Ferric ammonium citrate	1185575	Ammonium ferric citrate		
Ferric ammonium oxalate	2944674	Ammonium ferric oxalate		
	55488874			
Ferric chloride	7705080	Flores martis, iron trichloride		
Ferric fluoride	7783508			
Ferric nitrate	10421484	Iron nitrate		
Ferric sulfate	10028225	Ferric persulfate, ferric sesquisulfate, ferric tersulfate.		
Ferrous ammonium sulfate	10045893	Mohr's salt, iron ammonium sulfate		
Ferrous chloride	7758943	Iron chloride, iron dichloride, iron protochloride.		
Ferrous sulfate	7720787	Green vitriol		
	7782630	Iron vitriol, iron sulfate, iron protosulfate		
Formaldehyde	50000	Methyl aldehyde, methanal, formalin		
Formic acid	64186	Methanoic acid		
Fumaric acid	110178	Trans-butenedioic acid, trans-1,2-ethylenedicarboxylic acid, boletic acid, allomaleic acid.		
Furfural	98011	2-furaldehyde, pyromucic aldehyde		
Guthion	86500	Gusathion, azinphos-methyl		
Heptachlor	76448	Velsicol-104, Drinox, Heptagran		
Hexachlorocyclopentadiene	77474	Perchlorocyclopentadiene		
Hydrochloric acid	7647010	Hydrogen chloride, muriatic acid		
Hydrofluoric acid	7664393	Fluohydric acid		
Hydrogen cyanide	74908	Hydrocyanic acid		
Hydrogen sulfide	7783064	Hydrosulfuric acid sulfur hydride		
Isoprene	78795	2-methyl-1,3-butadiene		
Isopropanolamine dodecylbenzenesulfonate.	42504461			
Kepone	143500	Chlordecone 1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-1,3,4-metheno-2H-cyclobuta(cd)pentalen-2-one.		
Lead acetate	301042	Sugar of lead		
Lead arsenate	7784409			
	7645252			
	10102484			
Lead chloride	7758954			
Lead fluoborate	13814965	Lead fluoroborate		
Lead fluoride	7783462	Lead difluoride, plumbous fluoride		
Lead iodide	10101630			
Lead nitrate	10099748			
Lead stearate	7428480	Stearic acid lead salt		
	1072351			
	52652592			
Lead sulfate	7446142			
Lead sulfide	1314870	Galena		
Lead thiocyanate	592870	Lead sulfocyanate		

TABLE 116.4A—LIST OF HAZARDOUS SUBSTANCES—Continued

Common name	CAS No.	Synonyms	Isomers	CAS No.
Lindane	58899	Gamma-BHC, gamma-benzene hexachloride.		
Lithium chromate	14307358			
Malathion	121755	Phospothion		
Maleic acid	110167	Cis-butenedioic acid, cis-1,2-ethylenedicarboxylic acid, toxilic acid.		
Maleic anhydride	108316	2,5-furandione, cis-butenedioic anhydride, toxilic anhydride.		
Mercaptodimethur	203657	Mesurol		
Mercuric cyanide	592041	Mercury cyanide		
Mercuric nitrate	10045940	Mercury nitrate, mercury pernitrate		
Mercuric sulfate	7783359	Mercury sulfate, mercury persulfate		
Mercuric thiocyanate	592858	Mercury thiocyanate, mercuric sulfocyanate, mercuric sulfocyanide.		
Mercurous nitrate	7782867			
	10415755	Mercury protonitrate		
Methoxychlor	72435	DMDT, methoxy-DDT		
Methyl mercaptan	74931	Methanethiol, mercaptomethane, methyl sulfhydrate, thiomethyl alcohol.		
Methyl methacrylate	80626	Methacrylic acid methyl ester, methyl-2-methyl-2-propenoate.		
Methyl parathion	298000	Nitrox-80		
Mevinphos	7786347	Phosdrin		
Mexacarbate	315184	Zectran		
Monoethylamine	75047	Ethylamine, aminoethane		
Monomethylamine	74895	Methylamine, aminomethane		
Naled	300765	Dibrom		
Naphthalene	91203	White tar, tar camphor, naphthalin		
Naphthenic acid	1338245	Cyclohexanecarboxylic acid, hexahydrobenzoic acid.		
Nickel ammonium sulfate	15699180	Ammonium nickel sulfate		
Nickel chloride	37211055	Nickelous chloride		
	7718549			
Nickel hydroxide	12054487	Nickelous hydroxide		
Nickel nitrate	14216752			
Nickel sulfate	7786814	Nickelous sulfate		
Nitric acid	7697372	Aqua fortis		
Nitrobenzene	98953	Nitrobenzol, oil of mirbane		
Nitrogen dioxide	10102440	Nitrogen tetraoxide		
Nitrophenol (mixed)	25154556	Mononitrophenol	m-	554847
			o-	88755
			p-	100027
Nitrotoluene	1321126		Ortho	88722
			Meta	99081
			Para	99990
Paraformaldehyde	30525894	Paraform, Formagene, Triformol, polymerized formaldehyde, polyoxymethylene.		
Parathion	56382	DNTP, Niran		
Pentachlorophenol	87865	PCP, Penta		
Phenol	108952	Carbolic acid, phenyl hydroxide, hydroxybenzene, oxybenzene.		
Phosgene	75445	Diphosgene, carbonyl chloride, chloroformyl chloride.		
Phosphoric acid	7664382	Orthophosphoric acid		
Phosphorus	7723140	Black phosphorus, red phosphorus, white phosphorus, yellow phosphorus.		
Phosphorus oxychloride	10025873	Phosphoryl chloride, phosphorus chloride		
Phosphorus pentasulfide	1314803	Phosphoric sulfide, thiophosphoric anhydride, phosphorus persulfide.		
Phosphorus trichloride	7719122	Phosphorous chloride		
Polychorinated biphenyls	1336363	PCB, Aroclor, polychlorinated diphenyls		
Potassium arsenate	7784410			
Potassium arsenite	10124502	Potassium metaarsenite		
Potassium bichromate	7778509	Potassium dichromate		
Potassium chromate	7789006			
Potassium cyanide	151508			
Potassium hydroxide	1310583	Potassium hydrate, caustic potash, potassa		
Potassium permanganate	7722647	Chameleon mineral		
Propargite	2312358	Omite		

TABLE 116.4A—LIST OF HAZARDOUS SUBSTANCES—Continued

Common name	CAS No.	Synonyms	Isomers	CAS No.
Propionic acid	79094	Propanoic acid, methylacotic acid, ethylformic acid.		
Propionic anhydride	123626	Propanoic anhydride, methylacetic anhydride.		
Propylene oxide	75569	Propene oxide		
Pyrethrins	121299	Pyrethrin I		
	121211	Pyrethrin II		
Quinoline	91225	1-benzazine, benzo(b)pyridine, leuocoline, chinoleine, leucol.		
Resorcinol	108463	Resorcin, 1,3-benzenediol, meta-dihydroxybenzene.		
Selenium oxide	7446084	Selenium dioxide		
Silver nitrate	7761888	Nitric acid silver (1+) salt lunar caustic		
Sodium	7440235	Natrium		
Sodium arsenate	7631892	Disodium arsenate		
Sodium arsenite	7784465	Sodium metaarsenite		
Sodium bichromate	10588019	Sodium dichromate		
Sodium bifluoride	1333831			
Sodium bisulfite	7631905	Sodium acid sulfite, sodium hydrogen sulfite.		
Sodium chromate	7775113			
Sodium cyanide	143339			
Sodium dodecylbenzene-sulfonate	25155300			
Sodium fluoride	7681494	Villiaumite		
Sodium hydrosulfide	16721805	Sodium hydrogen sulfide		
Sodium hydroxide	1310732	Caustic soda, soda lye, sodium hydrate		
Sodium hypochlorite	7681529	Bleach		
	10022705			
Sodium methylate	124414	Sodium methoxide		
Sodium nitrite	7632000			
Sodium phosphate, dibasic	7558794			
	10039324			
	10140655			
Sodium phosphate, tribasic	7785844			
	7601549			
	10101890			
	10361894			
	7758294			
	10124568			
Sodium selenite	10102188			
	7782823			
Strontium chromate	7789062			
Strychnine	57249			
Styrene	100425	Vinylbenzene, phenylethylene, styrol, styrolene, cinnamene, cinnamol.		
Sulfuric acid	7664939	Oil of vitriol, oleum		
Sulfur monochloride	12771083	Sulfur chloride		
2,4,5-T acid	93765	2,4,5-trichlorophenoxyacetic acid		
2,4,5-T amines	6369966	Acetic acid (2,4,5-trichlorophenoxy)-compound with N,N-dimethylmethanamine (1:1).		
	6369977	Acetic acid (2,4,5-trichlorophenoxy)-compound with N-methylmethanamine (1:1).		
	1319728	Acetic acid (2,4,5-trichlorophenoxy)-compound with 1-amino-2-propanol (1:1).		
	3813147	Acetic acid (2,4,5-trichlorophenoxy)-compound with 2,2'2''-nitrilotris [ethanol] (1:1).		
2,4,5-T esters	2545597	2,4,5-trichlorophenoxyacetic esters		
	93798			
	61792072			
	1928478			
	25168154			
2,4,5-T salts	13560991	Acetic acid (2,4,5-trichlorophenoxy)-sodium salt.		
TDE	72548	DDD		
,4,5-TP acid	93721	Propanoic acid 2-(2,4,5-trichlorophenoxy)		
,4,5-TP esters	32534955	Propanoic acid, 2-(2,4,5-trichlorophenoxy)-, isooctyl ester.		
etraethyl lead	78002	Lead tetraethyl, TEL		

TABLE 116.4A—LIST OF HAZARDOUS SUBSTANCES—Continued

Common name	CAS No.	Synonyms	Isomers	CAS No.
Tetraethyl pyrophosphate	107493	TEPP		
Thallium sulfate	10031591			
	7446186			
Toluene	108883	Toluol, methylbenzene, phenylmethane, Methacide.		
Toxaphene	8001352	Camphechlor		
Trichlorfon	52686	Dipterex		
		Dylox		
Trichlorethylene	79016	Ethylene trichloride		
Trichlorophenol	25167822	Collunosol, Dowicide 2 or 2S, Omal, Phenachlor.	(2,3,4-)	15950660
			(2,3,5-)	933788
			(2,3,6-)	933755
			(2,4,5-)	95954
			(2,4,6-)	88062
			(3,4,5-)	609198
Triethanolamine dodecylbenzenesulfonate.	27323417			
Triethylamine	121448			
Trimethylamine	75503	TMA		
Uranyl acetate	541093			
Uranyl nitrate	10102064			
	36478769			
Vanadium pentoxide	1314621	Vanadic anhydride, vanadic acid anhydride		
Vanadyl sulfate	27774136	Vanadic sulfate, vanadium sulfate		
Vinyl acetate	108054	Acetic acid ethylene ether		
Vinylidene chloride	75354	1,1–dichlorethylene		
		1,1–dichloroethene		
Xylene (mixed)	1330207	Dimethylbenzene	m-	108383
		Xylol	o-	95476
			p-	106423
Xylenol	1300716	Dimethylphenol, hydroxydimethylbenzene		
Zinc acetate	557346			
Zinc ammonium chloride	14639975			
	14639986			
	52628258			
Zinc borate	1332076			
Zinc bromide	7699458			
Zinc carbonate	3486359			
Zinc chloride	7646857	Butter of zinc		
Zinc cyanide	557211			
Zinc fluoride	7783495			
Zinc formate	557415			
Zinc hydrosulfite	7779864			
Zinc nitrate	7779886			
Zinc phenolsulfonate	127822	Zinc sulfocarbolate		
Zinc phosphide	1314847			
Zinc silicofluoride	16871719	Zinc fluosilicate		
Zinc sulfate	7733020	White vitriol, zinc vitriol, white copperas		
Zirconium nitrate	13746899			
Zirconium potassium fluoride	16923958			
Zirconium sulfate	14644612	Disulfatozirconic acid		
Zirconium tetrachloride	10026116			

TABLE 116.4B—LIST OF HAZARDOUS SUBSTANCES BY CAS NUMBER

CAS No.	Common name
50000	Formaldehyde
50293	DDT
51285	2,4-Dinitrophenol
52686	Trichlorfon
56382	Parathion
56724	Coumaphos
57249	Strychnine
57749	Chlordane
58899	Lindane
60004	Ethylenediaminetetraacetic acid (EDTA)
60571	Dieldrin
62533	Aniline
62737	Dichlorvos
63252	Carbaryl
64186	Formic acid
64197	Acetic acid
65850	Benzoic acid

TABLE 116.4B—LIST OF HAZARDOUS SUBSTANCES BY CAS NUMBER—Continued

CAS No.	Common name
67663	Chloroform
71432	Benzene
72208	Endrin
72435	Methoxychlor
72546	TDE
74895	Monomethylamine
74908	Hydrogen cyanide
74931	Methyl mercaptan
75047	Monoethylamine
75070	Acetaldehyde
75150	Carbon disulfide
75207	Calcium carbide
75445	Phosgene
75503	Trimethylamine
75649	tert-Butylamine
75865	Acetone cyanohydrin
75990	2,2-Dichloropropionic acid
76448	Heptachlor
78002	Tetraethyl lead
78795	Isoprene
78819	iso-Butylamine
79094	Propionic acid
79312	iso-Butyric acid
79367	Acetyl chloride
80626	Methyl methacrylate
85007	Diquat
86500	Guthion
87865	Pentachlorophenol
88755	o-Nitrophenol
91203	Naphthalene
91225	Quinoline
93765	2,4,5–T acid
93798	2,4,5-T ester
94111	2,4–D ester
94757	2,4–D acid
94791	2,4–D ester
94804	2,4–D Butyl ester
95476	o-Xylene
95487	o–Cresol
98011	Furfural
98884	Benzoyl chloride
98953	Nitrobenzene
99650	m-Dinitrobenzene
100027	p-Nitrophenol
100254	p-Dinitrobenzene
100414	Ethylbenzene
100425	Styrene
100447	Benzyl chloride
100470	Benzonitrile
105464	sec-Butyl acetate
106423	p-Xylene
106445	p-Cresol
107028	Acrolein
107051	Allyl chloride
107131	Acrylonitrile
107153	Ethylenediamine
107186	Allyl alcohol
107493	Tetraethyl pyrophosphate
107926	n-Butyric acid
108054	Vinyl acetate
108247	Acetic anhydride
108316	Maleic anhydride
108383	m-Xylene
108394	m-Cresol
08463	Resorcinol
08883	Toluene
08907	Chlorobenzene
08952	Phenol
09739	n-Butylamine
109897	Diethylamine
110167	Maleic acid
110178	Fumaric acid
110190	iso-Butyl acetate
110827	Cyclohexane
115297	Endosulfan
115322	Dicofol
117806	Dichlone
121211	Pyrethrin
121299	Pyrethrin
121448	Triethylamine
121755	Malathion
123626	Propionic anhydride
123864	n-Butyl acetate
123922	iso-Amyl acetate
124403	Dimethylamine
124414	Sodium methylate
127822	Zinc phenolsulfonate
133062	Captan
142712	Cupric acetate
143339	Sodium cyanide
151508	Potassium cyanide
298000	Methyl parathion
298044	Disulfoton
300765	Naled
301042	Lead acetate
309002	Aldrin
315184	Mexacarbate
329715	2,5-Dinitrophenol
330541	Diuron
333415	Diazinon
506774	Cyanogen chloride
506876	Ammonium carbonate
506967	Acetyl bromide
513495	sec-Butylamine
528290	o-Dinitrobenzene
540885	tert-Butyl acetate
541093	Uranyl acetate
542621	Barium cyanide
543908	Cadmium acetate
544183	Cobaltous formate
554847	m-Nitrophenol
557211	Zinc cyanide
557346	Zinc acetate
557415	Zinc formate
563122	Ethion
573568	2,6-Dinitrophenol
592018	Calcium cyanide
592041	Mercuric cyanide
592858	Mercuric thiocyanate
592870	Lead thiocyanate
625161	tert-Amyl acetate
626380	sec-Amyl acetate
628637	n-Amyl acetate
631618	Ammonium acetate
815827	Cupric tartrate
1066304	Chromic acetate
1066337	Ammonium bicarbonate
1072351	Lead stearate
1111780	Ammonium carbamate
1185575	Ferric ammonium citrate
1194656	Dichlobenil
1300716	Xylenol
1303282	Arsenic pentoxide
1303328	Arsenic disulfide
1303339	Arsenic trisulfide
1309644	Antimony trioxide
1310583	Potassium hydroxide
1310732	Sodium hydroxide

TABLE 116.4B—LIST OF HAZARDOUS SUBSTANCES BY CAS NUMBER—Continued

CAS No.	Common name
1314621	Vanadium pentoxide
1314803	Phosphorus pentasulfide
1314847	Zinc phosphide
1314870	Lead sulfide
1319773	Cresol (mixed)
1320189	2,4-D ester
1327533	Arsenic trioxide
1330207	Xylene
1332076	Zinc borate
1333831	Sodium bifluoride
1336216	Ammonium hydroxide
1336363	Polychlorinated biphenyls
1338245	Naphthenic acid
1341497	Ammonium bifluoride
1762954	Ammonium thiocyanate
1863634	Ammonium benzoate
1918009	Dicamba
1928387	2,4-D esters
1928478	2,4,5-T ester
1928616	2,4-D ester
1929733	2,4-D ester
2545597	2,4,5-T ester
2764729	Diquat
2921882	Chlorpyrifos
2944674	Ferric ammonium oxalate
2971382	2,4-D ester
3012655	Ammonium citrate, dibasic
3164292	Ammonium tartrate
3251238	Cupric nitrate
3486359	Zinc carbonate
5893663	Cupric oxalate
5972736	Ammonium oxalate
6009707	Ammonium oxalate
6369966	2,4,5-T ester
7428480	Lead stearate
7440235	Sodium
7446084	Selenium oxide
7446142	Lead sulfate
7447394	Cupric chloride
7558794	Sodium phosphate, dibasic
7601549	Sodium phosphate, tribasic
7631892	Sodium arsenate
7631905	Sodium bisulfite
7632000	Sodium nitrite
7645252	Lead arsenate
7646857	Zinc chloride
7647010	Hydrochloric acid
7647189	Antimony pentachloride
7664382	Phosphoric acid
7664393	Hydrofluoric acid
7664417	Ammonia
7664939	Sulfuric acid
7681494	Sodium fluoride
7681529	Sodium hypochlorite
7697372	Nitric acid
7699458	Zinc bromide
7705080	Ferric chloride
7718549	Nickel chloride
7719122	Phosphorus trichloride
7720787	Ferrous sulfate
7722647	Potassium permanganate
7723140	Phosphorus
7733020	Zinc sulfate
7758294	Sodium phosphate, tribasic
7758943	Ferrous chloride
7758954	Lead chloride
7758987	Cupric sulfate
7773060	Ammonium sulfamate
7775113	Sodium chromate
7778441	Calcium arsenate
7778509	Potassium bichromate
7778543	Calcium hypochlorite
7779864	Zinc hydrosulfite
7779886	Zinc nitrate
7782505	Chlorine
7782630	Ferrous sulfate
7782823	Sodium selenite
7782867	Mercurous nitrate
7783359	Mercuric sulfate
7783462	Lead fluoride
7783495	Zinc fluoride
7783508	Ferric fluoride
7783564	Antimony trifluoride
7784341	Arsenic trichloride
7784409	Lead arsenate
7784410	Potassium arsenate
7784465	Sodium arsenite
7785844	Sodium phosphate, tribasic
7786347	Mevinphos
7786814	Nickel sulfate
7787475	Beryllium chloride
7787497	Beryllium fluoride
7787555	Beryllium nitrate
7788989	Ammonium chromate
7789006	Potassium chromate
7789062	Strontium chromate
7789095	Ammonium bichromate
7789426	Cadmium bromide
7789437	Cobaltous bromide
7789619	Antimony tribromide
7790945	Chlorosulfonic acid
8001352	Toxaphene
10022705	Sodium hypochlorite
10025873	Phosphorus oxychloride
10025919	Antimony trichloride
10026116	Zirconium tetrachloride
10028225	Ferric sulfate
10028247	Sodium phosphate, dibasic
10039324	Sodium phosphate, dibasic
10043013	Aluminum sulfate
10045893	Ferrous ammonium sulfate
10045940	Mercuric nitrate
10049055	Chromous chloride
10099748	Lead nitrate
10101538	Chromic sulfate
10101630	Lead iodide
10101890	Sodium phosphate, tribasic
10102064	Uranyl nitrate
10102188	Sodium selenite
10102440	Nitrogen dioxide
10102484	Lead arsenate
10108642	Cadmium chloride
10124502	Potassium arsenite
10124568	Sodium phosphate, tribasic
10140655	Sodium phosphate, dibasic
10192300	Ammonium bisulfite
10196040	Ammonium sulfite
10361894	Sodium phosphate, tribasic
10380297	Cupric sulfate, ammoniated
10415755	Mercurous nitrate
10421484	Ferric nitrate
10588019	Sodium bichromate
11115745	Chromic acid
12002038	Cupric acetoarsenite
12054487	Nickel hydroxide
12125018	Ammonium fluoride
12125029	Ammonium chloride
12135761	Ammonium sulfide

TABLE 116.4B—LIST OF HAZARDOUS SUBSTANCES BY CAS NUMBER—Continued

CAS No.	Common name
12771083	Sulfur chloride
13597994	Beryllium nitrate
13746899	Zirconium nitrate
13765190	Calcium chromate
13814965	Lead fluoborate
13826830	Ammonium fluoborate
13952846	sec-Butylamine
14017415	Cobaltous sulfamate
14216752	Nickel nitrate
14258492	Ammonium oxalate
14307358	Lithium chromate
14307438	Ammonium tartrate
14639975	Zinc ammonium chloride
14639986	Zinc ammonium chloride
14644612	Zirconium sulfate
15699180	Nickel ammonium sulfate
16721805	Sodium hydrosulfide
16871719	Zinc silicofluoride
16919190	Ammonium silicofluoride
16923958	Zirconium potassium fluoride
25154545	Dinitrobenzene
25154556	Nitrophenol
25155300	Sodium dodecylbenzenesulfonate
25167822	Trichlorophenol
25168154	2,4,5-T ester
25168267	2,4-D ester
26264062	Calcium dodecylbenzenesulfonate
27176870	Dodecylbenzenesulfonic acid
27323417	Triethanolamine dodecylbenzenesulfonate
27774136	Vanadyl sulfate
28300745	Antimony potassium tartrate
30525894	Paraformaldehyde
36478769	Uranyl nitrate
37211055	Nickel chloride
42504461	Dodecylbenzenesulfonate isopropanolamine
52628258	Zinc ammonium chloride
52740166	Calcium arsenite
53467111	2,4-D ester
55488874	Ferric ammonium oxalate
61792072	2,4,5-T ester

[43 FR 10474, Mar. 13, 1978; 43 FR 27533, June 26, 1978, as amended at 44 FR 10268, Feb. 16, 1979; 44 FR 65400, Nov. 13, 1979; 44 FR 66602, Nov. 20, 1979; 54 FR 33482, Aug. 14, 1989]

PART 117—DETERMINATION OF REPORTABLE QUANTITIES FOR HAZARDOUS SUBSTANCES

Subpart A—General Provisions

Sec.

117.1 Definitions.
117.2 Abbreviations.
117.3 Determination of reportable quantities.

Subpart B—Applicability

117.11 General applicability.
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Subpart C—Notice of Discharge of a Reportable Quantity

117.21 Notice.
117.22 Penalties.
117.23 Liabilities for removal.

AUTHORITY: Secs. 311 and 501(a), Federal Water Pollution Control Act (33 U.S.C. 1251 et seq.), ("the Act") and Executive Order 11735.

SOURCE: 44 FR 50776, Aug. 29, 1979, unless otherwise noted.

Subpart A—General Provisions

§ 117.1 Definitions.

As used in this part, all terms shall have the meanings stated in 40 CFR Part 116.

(a) "Reportable quantities" means quantities that may be harmful as set forth in § 117.3, the discharge of which is a violation of section 311(b)(3) and requires notice as set forth in § 117.21.

(b) "Administrator" means the Administrator of the Environmental Protection Agency ("EPA").

(c) "Mobile source" means any vehicle, rolling stock, or other means of transportation which contains or carries a reportable quantity of a hazardous substance.

(d) "Public record" means the NPDES permit application or the NPDES permit itself and the "record for final permit" as defined in 40 CFR 124.122.

(e) "National Pretreatment Standard" or "Pretreatment Standard" means any regulation containing pollutant discharge limits promulgated by the EPA in accordance with section 307 (b) and (c) of the Act, which applies to industrial users of a publicly owned treatment works. It further means any State or local pretreatment requirement applicable to a discharge and which is incorporated into a permit issued to a publicly owned treatment works under section 402 of the Act.

(f) "Publicly Owned Treatment Works" or "POTW" means a treatment works as defined by section 212 of the Act, which is owned by a State or municipality (as defined by section 502(4) of the Act). This definition includes any sewers that convey wastewater to such a treatment works, but does not include pipes, sewers or other conveyances not connected to a facility providing treatment. The term also means the municipality as defined in section 502(4) of the Act, which has jurisdiction over the indirect discharges to and the discharges from such a treatment works.

(g) "Remove" or "removal" refers to removal of the oil or hazardous substances from the water and shoreline or the taking of such other actions as may be necessary to minimize or mitigate damage to the public health or welfare, including, but not limited to, fish, shellfish, wildlife, and public and private property, shorelines, and beaches.

(h) "Contiguous zone" means the entire zone established by the United States under Article 24 of the Convention on the Territorial Sea and Contiguous Zone.

(i) "Navigable waters" means "waters of the United States, including the territorial seas." This term includes:

(1) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

(2) Interstate waters, including interstate wetlands;

(3) All other waters such as intrastate lakes, rivers, streams, (including intermittent streams), mudflats, sandflats, and wetlands, the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters:

(i) Which are or could be used by interstate or foreign travelers for recreational or other purposes;

(ii) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce;

(iii) Which are used or could be used for industrial purposes by industries in interstate commerce;

(4) All impoundments of waters otherwise defined as navigable waters under this paragraph;

(5) Tributaries of waters identified in paragraphs (i) (1) through (4) of this section, including adjacent wetlands; and

(6) Wetlands adjacent to waters identified in paragraphs (i) (1) through (5) of this section ("Wetlands" means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally included playa lakes, swamps, marshes, bogs, and similar areas such as sloughs, prairie potholes, wet meadows, prairie river overflows, mudflats, and natural ponds): *Provided*, That waste treatment systems (other than cooling ponds meeting the criteria of this paragraph) are not waters of the United States.

(j) "Process waste water" means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product.

§ 117.2 Abbreviations.

NPDES equals National Pollutant Discharge Elimination System. RQ equals reportable quantity.

§ 117.3 Determination of reportable quantities.

Each substance in Table 117.3 that is listed in Table 302.4, 40 CFR Part 302, is assigned the reportable quantity listed in Table 302.4 for that substance.

[50 FR 13513, Apr. 4, 1985]

TABLE 117.3—REPORTABLE QUANTITIES OF HAZARDOUS SUBSTANCES DESIGNATED PURSUANT TO SECTION 311 OF THE CLEAN WATER ACT

NOTE: The first number under the column headed "RQ" is the reportable quantity in pounds. The number in parentheses is the metric equivalent in kilograms. For convenience, the table contains a column headed "Category" which lists the code letters "X", "A", "B", "C", and "D" associated with reportable quantities of 1, 10, 100, 1000, and 5000 pounds, respectively.

Material	Category	RQ in pounds (kilograms)
Acetaldehyde	C	1,000 (454)
Acetic acid	D	5,000 (2,270)
Acetic anhydride	D	5,000 (2,270)
Acetone cyanohydrin	A	10 (4.54)
Acetyl bromide	D	5,000 (2,270)
Acetyl chloride	D	5,000 (2,270)
Acrolein	X	1 (0.454)
Acrylonitrile	B	100 (45.4)
Adipic acid	D	5,000 (2,270)
Aldrin	X	1 (0.454)
Allyl alcohol	B	100 (45.4)
Allyl chloride	C	1,000 (454)
Aluminum sulfate	D	5,000 (2,270)
Ammonia	B	100 (45.4)
Ammonium acetate	D	5,000 (2,270)
Ammonium benzoate	D	5,000 (2,270)
Ammonium bicarbonate	D	5,000 (2,270)
Ammonium bichromate	A	10 (4.54)
Ammonium bifluoride	B	100 (45.4)
Ammonium bisulfite	D	5,000 (2,270)
Ammonium carbamate	D	5,000 (2,270)
Ammonium carbonate	D	5,000 (2,270)
Ammonium chloride	D	5,000 (2,270)
Ammonium chromate	A	10 (4.54)
Ammonium citrate dibasic	D	5,000 (2,270)
Ammonium fluoborate	D	5,000 (2,270)
Ammonium fluoride	B	100 (45.4)
Ammonium hydroxide	C	1,000 (454)
Ammonium oxalate	D	5,000 (2,270)
Ammonium silicofluoride	C	1,000 (454)
Ammonium sulfamate	D	5,000 (2,270)
Ammonium sulfide	B	100 (45.4)
Ammonium sulfite	D	5,000 (2,270)
Ammonium tartrate	D	5,000 (2,270)
Ammonium thiocyanate	D	5,000 (2,270)
Amyl acetate	D	5,000 (2,270)
Aniline	D	5,000 (2,270)
Antimony pentachloride	C	1,000 (454)
Antimony potassium tartrate	B	100 (45.4)
Antimony tribromide	C	1,000 (454)
Antimony trichloride	C	1,000 (454)
Antimony trifluoride	C	1,000 (454)
Antimony trioxide	C	1,000 (454)
Arsenic disulfide	X	1 (0.454)
Arsenic pentoxide	X	1 (0.454)
Arsenic trichloride	X	1 (0.454)
Arsenic trioxide	X	1 (0.454)
Arsenic trisulfide	X	1 (0.454)
Barium cyanide	A	10 (4.54)
Benzene	A	10 (4.54)
Benzoic acid	D	5,000 (2,270)
Benzonitrile	D	5,000 (2,270)
Benzoyl chloride	C	1,000 (454)
Benzyl chloride	B	100 (45.4)
Beryllium chloride	X	1 (0.454)
Beryllium fluoride	X	1 (0.454)
Beryllium nitrate	X	1 (0.454)
Butyl acetate	D	5,000 (2,270)
Butylamine	C	1,000 (454)
n-Butyl phthalate	A	10 (4.54)
Butyric acid	D	5,000 (2,270)
Cadmium acetate	A	10 (4.54)
Cadmium bromide	A	10 (4.54)
Cadmium chloride	A	10 (4.54)
Calcium arsenate	X	1 (0.454)
Calcium arsenite	X	1 (0.454)
Calcium carbide	A	10 (4.54)

Material	Category	RQ in pounds (kilograms)
Calcium chromate	A	10 (4.54)
Calcium cyanide	A	10 (4.54)
Calcium dodecylbenzenesulfonate	C	1,000 (454)
Calcium hypochlorite	A	10 (4.54)
Captan	A	10 (4.54)
Carbaryl	B	100 (45.4)
Carbofuran	A	10 (4.54)
Carbon disulfide	B	100 (45.4)
Carbon tetrachloride	A	10 (4.54)
Chlordane	X	1 (0.454)
Chlorine	A	10 (4.54)
Chlorobenzene	B	100 (45.4)
Chloroform	A	10 (4.54)
Chlorosulfonic acid	C	1,000 (454)
Chlorpyrifos	X	1 (0.454)
Chromic acetate	C	1,000 (454)
Chromic acid	A	10 (4.54)
Chromic sulfate	C	1,000 (454)
Chromous chloride	C	1,000 (454)
Cobaltous bromide	C	1,000 (454)
Cobaltous formate	C	1,000 (454)
Cobaltous sulfamate	C	1,000 (454)
Coumaphos	A	10 (4.54)
Cresol	C	1,000 (454)
Crotonaldehyde	B	100 (45.4)
Cupric acetate	B	100 (45.4)
Cupric acetoarsenite	X	1 (0.454)
Cupric chloride	A	10 (4.54)
Cupric nitrate	B	100 (45.4)
Cupric oxalate	B	100 (45.4)
Cupric sulfate	A	10 (4.54)
Cupric sulfate, ammoniated	B	100 (45.4)
Cupric tartrate	B	100 (45.4)
Cyanogen chloride	A	10 (4.54)
Cyclohexane	C	1,000 (454)
2,4-D Acid	B	100 (45.4)
2,4-D Esters	B	100 (45.4)
DDT	X	1 (0.454)
Diazinon	X	1 (0.454)
Dicamba	C	1,000 (454)
Dichlobenil	B	100 (45.4)
Dichlone	X	1 (0.454)
Dichlorobenzene	B	100 (45.4)
Dichloropropane	C	1,000 (454)
Dichloropropene	B	100 (45.4)
Dichloropropene-Dichloropropane (mixture)	B	100 (45.4)
2,2-Dichloropropionic acid	D	5,000 (2,270)
Dichlorvos	A	10 (4.54)
Dicofol	A	10 (4.54)
Dieldrin	X	1 (0.454)
Diethylamine	B	100 (45.4)
Dimethylamine	C	1,000 (454)
Dinitrobenzene (mixed)	B	100 (45.4)
Dinitrophenol	A	10 (45.4)
Dinitrotoluene	A	10 (4.54)
Diquat	C	1,000 (454)
Disulfoton	X	1 (0.454)
Diuron	B	100 (45.4)
Dodecylbenzenesulfonic acid	C	1,000 (454)
Endosulfan	X	1 (0.454)
Endrin	X	1 (0.454)
Epichlorohydrin	B	100 (45.4)
Ethion	A	10 (4.54)
Ethylbenzene	C	1,000 (454)
Ethylenediamine	D	5,000 (2,270)
Ethylenediamine-tetraacetic acid (EDTA)	D	5,000 (2,270)
Ethylene dibromide	X	1 (0.454)
Ethylene dichloride	B	100 (45.4)
Ferric ammonium citrate	C	1,000 (454)
Ferric ammonium oxalate	C	1,000 (454)
Ferric chloride	C	1,000 (454)
Ferric fluoride	B	100 (45.4)
Ferric nitrate	C	1,000 (454)

Material	Category	RQ in pounds (kilograms)
Ferric sulfate	C	1,000 (454)
Ferrous ammonium sulfate	C	1,000 (454)
Ferrous chloride	B	100 (45.4)
Ferrous sulfate	C	1,000 (454)
Formaldehyde	B	100 (45.4)
Formic acid	D	5,000 (2,270)
Fumaric acid	D	5,000 (2,270)
Furfural	D	5,000 (2,270)
Guthion	X	1 (0.454)
Heptachlor	X	1 (0.454)
Hexachlorocyclopentadiene	A	10 (4.54)
Hydrochloric acid	D	5,000 (2,270)
Hydrofluoric acid	B	100 (45.4)
Hydrogen cyanide	A	10 (4.54)
Hydrogen sulfide	B	100 (45.4)
Isoprene	B	100 (45.4)
Isopropanolamine dodecylbenzenesulfonate	C	1,000 (454)
Kepone	X	1 (0.454)
Lead acetate	D	5,000 (2,270)
Lead arsenate	X	1 (0.454)
Lead chloride	B	100 (45.4)
Lead fluoborate	B	100 (45.4)
Lead fluoride	B	100 (45.4)
Lead iodide	B	100 (45.4)
Lead nitrate	B	100 (45.4)
Lead stearate	D	5,000 (2,270)
Lead sulfate	B	100 (45.4)
Lead sulfide	D	5,000 (2,270)
Lead thiocyanate	B	100 (45.4)
Lindane	X	1 (0.454)
Lithium chromate	A	10 (4.54)
Malathion	B	100 (45.4)
Maleic acid	D	5,000 (2,270)
Maleic anhydride	D	5,000 (2,270)
Mercaptodimethur	A	10 (4.54)
Mercuric cyanide	X	1 (0.454)
Mercuric nitrate	A	10 (4.54)
Mercuric sulfate	A	10 (4.54)
Mercuric thiocyanate	A	10 (4.54)
Mercurous nitrate	A	10 (4.54)
Methoxychlor	X	1 (0.454)
Methyl mercaptan	B	100 (45.4)
Methyl methacrylate	C	1,000 (454)
Methyl parathion	B	100 (45.4)
Mevinphos	A	10 (4.54)
Mexacarbate	C	1,000 (454)
Monoethylamine	B	100 (45.4)
Monomethylamine	B	100 (45.4)
aled	A	10 (4.54)
aphthalene	B	100 (45.4)
aphthenic acid	B	100 (45.4)
ckel ammonium sulfate	B	100 (45.4)
ckel chloride	B	100 (45.4)
ckel hydroxide	A	10 (4.54)
ckel nitrate	B	100 (45.4)
ckel sulfate	B	100 (45.4)
ric acid	C	1,000 (454)
robenzene	C	1,000 (454)
rogen dioxide	A	10 (4.54)
rophenol (mixed)	B	100 (45.4)
rotoluene	C	1,000 (454)
raformaldehyde	C	1,000 (454)
rathion	A	10 (4.54)
ntachlorophenol	A	10 (4.54)
enol	C	1,000 (454)
osgene	A	10 (4.54)
osphoric acid	D	5,000 (2,270)
osphorus	X	1 (0.454)
osphorus oxychloride	C	1,000 (454)
osphorus pentasulfide	B	100 (45.4)
osphorus trichloride	C	1,000 (454)
chlorinated biphenyls	X	1 (0.454)
ssium arsenate	X	1 (0.454)

Material	Category	RQ in pounds (kilogram
Potassium arsenite	X	1 (0.454)
Potassium bichromate	A	10 (4.54)
Potassium chromate	A	10 (4.54)
Potassium cyanide	A	10 (4.54)
Potassium hydroxide	C	1,000 (454)
Potassium permanganate	B	100 (45.4)
Propargite	A	10 (4.54)
Propionic acid	D	5,000 (2,270)
Propionic anhydride	D	5,000 (2,270)
Propylene oxide	B	100 (45.4)
Pyrethrins	X	1 (0.454)
Quinoline	D	5,000 (2,270)
Resorcinol	D	5,000 (2,270)
Selenium oxide	A	10 (4.54)
Silver nitrate	X	1 (0.454)
Sodium	A	10 (4.54)
Sodium arsenate	X	1 (0.454)
Sodium arsenite	X	1 (0.454)
Sodium bichromate	A	10 (4.54)
Sodium bifluoride	B	100 (45.4)
Sodium bisulfite	D	5,000 (2,270)
Sodium chromate	A	10 (4.54)
Sodium cyanide	A	10 (4.54)
Sodium dodecylbenzenesulfonate	C	1,000 (454)
Sodium fluoride	C	1,000 (454)
Sodium hydrosulfide	D	5,000 (2,270)
Sodium hydroxide	C	1,000 (454)
Sodium hypochlorite	B	100 (45.4)
Sodium methylate	C	1,000 (454)
Sodium nitrite	B	100 (45.4)
Sodium phosphate, dibasic	D	5,000 (2,270)
Sodium phosphate, tribasic	D	5,000 (2,270)
Sodium selenite	B	100 (45.4)
Strontium chromate	A	10 (4.54)
Strychnine	A	10 (4.54)
Styrene	C	1,000 (454)
Sulfuric acid	C	1,000 (454)
Sulfur monochloride	C	1,000 (454)
2,4,5-T acid	C	1,000 (454)
2,4,5-T amines	D	5,000 (2,270)
2,4,5-T esters	C	1,000 (454)
2,4,5-T salts	C	1,000 (454)
TDE	X	1 (0.454)
2,4,5-TP acid	B	100 (45.4)
2,4,5-TP acid esters	B	100 (45.4)
Tetraethyl lead	A	10 (4.54)
Tetraethyl pyrophosphate	A	10 (4.54)
Thallium sulfate	B	100 (45.4)
Toluene	C	1,000 (454)
Toxaphene	X	1 (0.454)
Trichlorfon	B	100 (45.4)
Trichloroethylene	B	100 (45.4)
Trichlorophenol	A	10 (4.54)
Triethanolamine dodecylbenzenesulfonate	C	1,000 (454)
Triethylamine	D	5,000 (2,270)
Trimethylamine	B	100 (45.4)
Uranyl acetate	B	100 (45.4)
Uranyl nitrate	B	100 (45.4)
Vanadium pentoxide	C	1,000 (454)
Vanadyl sulfate	C	1,000 (454)
Vinyl acetate	D	5,000 (2,270)
Vinylidene chloride	B	100 (45.4)
Xylene (mixed)	C	1,000 (454)
Xylenol	C	1,000 (454)
Zinc acetate	C	1,000 (454)
Zinc ammonium chloride	C	1,000 (454)
Zinc borate	C	1,000 (454)
Zinc bromide	C	1,000 (454)
Zinc carbonate	C	1,000 (454)
Zinc chloride	C	1,000 (454)
Zinc cyanide	A	10 (4.54)
Zinc fluoride	C	1,000 (454)
Zinc formate	C	1,000 (454)

Material	Category	RQ in pounds (kilograms)
Zinc hydrosulfite	C	1,000 (454)
Zinc nitrate	C	1,000 (454)
Zinc phenolsulfonate	D	5,000 (2,270)
Zinc phosphide	B	100 (45.4)
Zinc silicofluoride	D	5,000 (2,270)
Zinc sulfate	C	1,000 (454)
Zirconium nitrate	D	5,000 (2,270)
Zirconium potassium fluoride	C	1,000 (454)
Zirconium sulfate	D	5,000 (2,270)
Zirconium tetrachloride	D	5,000 (2,270)

[51 FR 34547, Sept. 29, 1986; 54 FR 33482, Aug. 14, 1989]

Subpart B—Applicability

§ 117.11 General applicability.

This regulation sets forth a determination of the reportable quantity for each substance designated as hazardous in 40 CFR Part 116. The regulation applies to quantities of designated substances equal to or greater than the reportable quantities, when discharged into or upon the navigable waters of the United States, adjoining shorelines, into or upon the contiguous zone, or beyond the contiguous zone as provided in section 311(b)(3) of the Act, except to the extent that the owner or operator can show such that discharges are made:

(a) In compliance with a permit issued under the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1401 et seq.);

(b) In compliance with approved water treatment plant operations as specified by local or State regulations pertaining to safe drinking water;

(c) Pursuant to the label directions for application of a pesticide product registered under section 3 or section 24 of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended (7 U.S.C. 136 *et seq.*), or pursuant to the terms and conditions of an experimental use permit issued under section 5 of FIFRA, or pursuant to an exemption granted under section 18 of FIFRA;

(d) In compliance with the regulations issued under section 3004 or with permit conditions issued pursuant to section 3005 of the Resource Conservation and Recovery Act (90 Stat. 2795; 42 U.S.C. 6901);

(e) In compliance with instructions of the On-Scene Coordinator pursuant to 40 CFR Part 1510 (the National Oil and Hazardous Substances Pollution Plan) or 33 CFR 153.10(e) (Pollution by Oil and Hazardous Substances) or in accordance with applicable removal regulations as required by section 311(j)(1)(A);

(f) In compliance with a permit issued under § 165.7 of Title 14 of the State of California Administrative Code;

(g) From a properly functioning inert gas system when used to provide inert gas to the cargo tanks of a vessel;

(h) From a permitted source and are excluded by § 117.12 of this regulation;

(i) To a POTW and are specifically excluded or reserved in § 117.13; or

(j) In compliance with a permit issued under section 404(a) of the Clean Water Act or when the discharges are exempt from such requirements by section 404(f) or 404(r) of the Act (33 U.S.C. 1344(a), (f), (r)).

§ 117.12 Applicability to discharges from facilities with NPDES permits.

(a) This regulation does not apply to:

(1) Discharges in compliance with a permit under section 402 of this Act;

(2) Discharges resulting from circumstances identified, reviewed and made a part of the public record with respect to a permit issued or modified under section 402 of this Act, and subject to a condition in such permit;

(3) Continuous or anticipated intermittent discharges from a point source, identified in a permit or permit application under section 402 of this Act, which are caused by events occurring within the scope of the relevant operating or treatment systems; or

(b) A discharge is "in compliance with a permit issued under section 402 of this Act" if the permit contains an effluent limitation specifically applicable to the substance discharged or an effluent limitation applicable to another waste parameter which has been specifically identified in the permit as intended to limit such substance, and the discharge is in compliance with the effluent limitation.

(c) A discharge results "from circumstances identified, reviewed and made a part of the public record with respect to a permit issued or modified under section 402 of the Act, and subject to a condition in such permit," whether or not the discharge is in compliance with the permit, where:

(1) The permit application, the permit, or another portion of the public record contains documents that specifically identify:

(i) The substance and the amount of the substance; and

(ii) The origin and source of the substance; and

(iii) The treatment which is to be provided for the discharge either by:

(A) An on-site treatment system separate from any treatment system treating the permittee's normal discharge; or

(B) A treatment system designed to treat the permittee's normal discharge and which is additionally capable of treating the identified amount of the identified substance; or

(C) Any combination of the above; and

(2) The permit contains a requirement that the substance and amounts of the substance, as identified in § 117.12(c)(1)(i) and § 117.12(c)(1)(ii) be treated pursuant to § 117.12(c)(1)(iii) in the event of an on-site release; and

(3) The treatment to be provided is in place.

(d) A discharge is a "continuous or anticipated intermittent discharge from a point source, identified in a permit or permit application under section 402 of this Act, and caused by events occurring within the scope of the relevant operating or treatment systems," whether or not the discharge is in compliance with the permit, if:

(1) The hazardous substance is discharged from a point source for which a valid permit exists or for which a permit application has been submitted; and

(2) The discharge of the hazardous substance results from:

(i) The contamination of noncontact cooling water or storm water, provided that such cooling water or storm water is not contaminated by an on-site spill of a hazardous substance; or

(ii) A continuous or anticipated intermittent discharge of process waste water, and the discharge originates within the manufacturing or treatment systems; or

(iii) An upset or failure of a treatment system or of a process producing a continuous or anticipated intermittent discharge where the upset or failure results from a control problem, an operator error, a system failure or malfunction, an equipment or system startup or shutdown, an equipment wash, or a production schedule change, provided that such upset or failure is not caused by an on-site spill of a hazardous substance.

[44 FR 50776, Aug. 29, 1979, as amended at 44 FR 58910, Oct. 12, 1979]

§ 117.13 Applicability to discharges from publicly owned treatment works and their users.

(a) [Reserved]

(b) These regulations apply to all discharges of reportable quantities to a POTW, where the discharge originates from a mobile source, except where such source has contracted with, or otherwise received written permission from the owners or operators of the POTW to discharge that quantity, and the mobile source can show that prior to accepting the substance from an industrial discharger, the substance had been treated to comply with any effluent limitation under sections 301, 302 or 306 or pretreatment standard under section 307 applicable to that facility.

§ 117.14 Demonstration projects.

Notwithstanding any other provision of this part, the Administrator of the Environmental Protection Agency may, on a case-by-case basis, allow the discharge of designated hazardous substances in connection with research or demonstration projects relating to the prevention, control, or abatement of hazardous substance pollution. The Administrator will allow such a discharge only where he determines that the expected environmental benefit from such a discharge will outweigh the potential hazard associated with the discharge.

Subpart C—Notice of Discharge of a Reportable Quantity

§ 117.21 Notice.

Any person in charge of a vessel or an onshore or an offshore facility shall, as soon as he has knowledge of any discharge of a designated hazardous substance from such vessel or facility in quantities equal to or exceeding in any 24-hour period the reportable quantity determined by this part, immediately notify the appropriate agency of the United States Government of such discharge. Notice shall be given in accordance with such procedures as the Secretary of Transportation has set forth in 33 CFR 153.203. This provision applies to all discharges not specifically excluded or reserved by another section of these regulations.

§ 117.22 Penalties.

(a) Any person in charge of a vessel or an onshore or offshore facility who fails to notify the United States Government of a prohibited discharge pursuant to § 117.21 (except in the case of a discharge beyond the contiguous zone, where the person in charge of a vessel is not otherwise subject to the jurisdiction of the United States) shall be subject to a fine of not more than $10,000 or imprisonment for not more than one year, or both, pursuant to section 311(b)(5).

(b) The owner, operator or person in charge of a vessel or an onshore or offshore facility from which is discharged a hazardous substance designated in 40 CFR Part 116 in a quantity equal to or exceeding in any 24-hour period, the reportable quantity established in this part (except in the case of a discharge beyond the contiguous zone, where the person in charge of a vessel is not otherwise subject to the jurisdiction of the United States), shall be assessed a civil penalty of up to $5,000 per violation under section 311(b)(6)(A). Alternatively, upon a determination by the Administrator, a civil action will be commenced under section 311(b)(6)(B) to impose a penalty not to exceed $50,000 unless such discharge is the result of willful negligence or willful misconduct within the privity and knowledge of the owner, operator, or person in charge, in which case the penalty shall not exceed $250,000.

NOTE: The Adminstrator will take into account the gravity of the offense and the standard of care manifest by the owner, operator, or person in charge in determining whether a civil action will be commenced under section 311(b)(6)(B). The gravity of the offense will be interpreted to include the size of the discharge, the degree of danger or harm to the public health, safety, or the environment, including consideration of toxicity, degradability, and dispersal characteristics of the substance, previous spill history, and previous violation of any spill prevention regulations. Particular emphasis will be placed on the standard of care and the extent of mitigation efforts manifest by the owner, operator, or person in charge.

§ 117.23 Liabilities for removal.

In any case where a substance designated as hazardous in 40 CFR Part 116 is discharged from any vessel or onshore or offshore facility in a quantity equal to or exceeding the reportable quantity determined by this part, the owner, operator or person in charge will be liable, pursuant to section 311 (f) and (g) of the Act, to the United States Government for the actual costs incurred in the removal of such substance, subject only to the defenses and monetary limitations enumerated in section 311 (f) and (g) of the Act.

The Administrator may act to mitigate the damage to the public health or welfare caused by a discharge and the cost of such mitigation shall be considered a cost incurred under section 311(c) for the removal of that substance by the United States Government.

PART 121—STATE CERTIFICATION OF ACTIVITIES REQUIRING A FEDERAL LICENSE OR PERMIT

Subpart A—General

Sec.
121.1 Definitions.
121.2 Contents of certification.
121.3 Contents of application.

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121.12 Supplemental information.
121.13 Review by Regional Administrator and notification.
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121.21 When Administrator certifies.
121.22 Applications.
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121.27 Notification to licensing or permitting agency.
121.28 Termination of suspension.

Subpart D—Consultations

121.30 Review and advice.

AUTHORITY: Sec. 21 (b) and (c), 84 Stat. 91 (33 U.S.C. 1171(b) (1970)); Reorganization Plan No. 3 of 1970.

SOURCE: 36 FR 22487, Nov. 25, 1971, unless otherwise noted. Redesignated at 37 FR 21441, Oct. 11, 1972 and 44 FR 32899, June 7, 1979.

Subpart A—General

§ 121.1 Definitions.

As used in this part, the following terms shall have the meanings indicated below:

(a) "License or permit" means any license or permit granted by an agency of the Federal Government to conduct any activity which may result in any discharge into the navigable waters of the United States.

(b) "Licensing or permitting agency" means any agency of the Federal Government to which application is made for a license or permit.

(c) "Administrator" means the Administrator, Environmental Protection Agency.

(d) "Regional Administrator" means the Regional designee appointed by the Administrator, Environmental Protection Agency.

(e) "Certifying agency" means the person or agency designated by the Governor of a State, by statute, or by other governmental act, to certify compliance with applicable water quality standards. If an interstate agency has sole authority to so certify for the area within its jurisdiction, such interstate agency shall be the certifying agency. Where a State agency and an interstate agency have concurrent authority to certify, the State agency shall be the certifying agency. Where water quality standards have been promulgated by the Administrator pursuant to section 10(c)(2) of the Act, or where no State or interstate agency has authority to certify, the Administrator shall be the certifying agency.

(f) "Act" means the Federal Water Pollution Control Act, 33 U.S.C. 1151, et seq.

(g) "Water quality standards" means standards established pursuant to section 10(c) of the Act, and State-adopted water quality standards for navigable waters which are not interstate waters.

§ 121.2 Contents of certification.

(a) A certification made by a certifying agency shall include the following:

(1) The name and address of the applicant;

(2) A statement that the certifying agency has either (i) examined the application made by the applicant to the licensing or permitting agency (specifically identifying the number or code affixed to such application) and bases its certification upon an evaluation of the information contained in such application which is relevant to water quality considerations, or (ii) examined other information furnished by the applicant sufficient to permit the certifying agency to make the state-

ment described in paragraph (a)(3) of this section;

(3) A statement that there is a reasonable assurance that the activity will be conducted in a manner which will not violate applicable water quality standards;

(4) A statement of any conditions which the certifying agency deems necessary or desirable with respect to the discharge of the activity; and

(5) Such other information as the certifying agency may determine to be appropriate.

(b) The certifying agency may modify the certification in such manner as may be agreed upon by the certifying agency, the licensing or permitting agency, and the Regional Administrator.

§ 121.3 Contents of application.

A licensing or permitting agency shall require an applicant for a license or permit to include in the form of application such information relating to water quality considerations as may be agreed upon by the licensing or permitting agency and the Administrator.

Subpart B—Determination of Effect on Other States

§ 121.11 Copies of documents.

(a) Upon receipt from an applicant of an application for a license or permit without an accompanying certification, the licensing or permitting agency shall either: (1) Forward one copy of the application to the appropriate certifying agency and two copies to the Regional Administrator, or (2) forward three copies of the application to the Regional Administrator, pursuant to an agreement between the licensing or permitting agency and the Administrator that the Regional Administrator will transmit a copy of the application to the appropriate certifying agency. Upon subsequent receipt from an applicant of a certification, the licensing or permitting agency shall forward a copy of such certification to the Regional Administrator, unless such certification shall have been made by the Regional Administrator pursuant to § 121.24.

(b) Upon receipt from an applicant of an application for a license or permit with an accompanying certification, the licensing or permitting agency shall forward two copies of the application and certification to the Regional Administrator.

(c) Only those portions of the application which relate to water quality considerations shall be forwarded to the Regional Administrator.

§ 121.12 Supplemental information.

If the documents forwarded to the Regional Administrator by the licensing or permitting agency pursuant to § 121.11 do not contain sufficient information for the Regional Administrator to make the determination provided for in § 121.13, the Regional Administrator may request, and the licensing or permitting agency shall obtain from the applicant and forward to the Regional Administrator, any supplemental information as may be required to make such determination.

§ 121.13 Review by Regional Administrator and notification.

The Regional Administrator shall review the application, certification, and any supplemental information provided in accordance with §§ 121.11 and 121.12 and if the Regional Administrator determines there is reason to believe that a discharge may affect the quality of the waters of any State or States other than the State in which the discharge originates, the Regional Administrator shall, no later than 30 days of the date of receipt of the application and certification from the licensing or permitting agency as provided in § 121.11, so notify each affected State, the licensing or permitting agency, and the applicant.

§ 121.14 Forwarding to affected State.

The Regional Administrator shall forward to each affected State a copy of the material provided in accordance with § 121.11.

§ 121.15 Hearings on objection of affected State.

When a licensing or permitting agency holds a public hearing on the objection of an affected State, notice of such objection, including the grounds for such objection, shall be forwarded to the Regional Administrator by the licensing or permitting agency no later than 30 days prior to such hearing. The Regional Administrator shall at such hearing submit his evaluation with respect to such objection and his recommendations as to whether and under what conditions the license or permit should be issued.

§ 121.16 Waiver.

The certification requirement with respect to an application for a license or permit shall be waived upon:

(a) Written notification from the State or interstate agency concerned that it expressly waives its authority to act on a request for certification; or

(b) Written notification from the licensing or permitting agency to the Regional Administrator of the failure of the State or interstate agency concerned to act on such request for certification within a reasonable period of time after receipt of such request, as determined by the licensing or permitting agency (which period shall generally be considered to be 6 months, but in any event shall not exceed 1 year).

In the event of a waiver hereunder, the Regional Administrator shall consider such waiver as a substitute for a certification, and as appropriate, shall conduct the review, provide the notices, and perform the other functions identified in §§ 121.13, 121.14, and 121.15. The notices required by § 121.13 shall be provided not later than 30 days after the date of receipt by the Regional Administrator of either notification referred to herein.

Subpart C—Certification by the Administrator

§ 121.21 When Administrator certifies.

Certification by the Administrator that the discharge resulting from an activity requiring a license or permit will not violate applicable water quality standards will be required where:

(a) Standards have been promulgated, in whole or in part, by the Administrator pursuant to section 10(c)(2) of the Act: *Provided, however,* That the Administrator will certify compliance only with respect to those water quality standards promulgated by him; or

(b) Water quality standards have been established, but no State or interstate agency has authority to give such a certification.

§ 121.22 Applications.

An applicant for certification from the Administrator shall submit to the Regional Administrator a complete description of the discharge involved in the activity for which certification is sought, with a request for certification signed by the applicant. Such description shall include the following:

(a) The name and address of the applicant;

(b) A description of the facility or activity, and of any discharge into navigable waters which may result from the conduct of any activity including, but not limited to, the construction or operation of the facility, including the biological, chemical, thermal, and other characteristics of the discharge, and the location or locations at which such discharge may enter navigable waters;

(c) A description of the function and operation of equipment or facilities to treat wastes or other effluents which may be discharged, including specification of the degree of treatment expected to be attained;

(d) The date or dates on which the activity will begin and end, if known, and the date or dates on which the discharge will take place;

(e) A description of the methods and means being used or proposed to monitor the quality and characteristics of the discharge and the operation of equipment or facilities employed in the treatment or control of wastes or other effluents.

§ 121.23 Notice and hearing.

The Regional Administrator will provide public notice of each request for certification by mailing to State, County, and municipal authorities, heads of State agencies responsible for water quality improvement, and other parties known to be interested in the matter, including adjacent property owners and conservation organizations, or may provide such notice in a newspaper of general circulation in the area in which the activity is pro posed to be conducted if the Regional Administrator deems mailed notice to be impracticable. Interested parties shall be provided an opportunity to comment on such request in such manner as the Regional Administrator deems appropriate. All interested and affected parties will be given reasonable opportunity to present evidence and testimony at a public hearing on the question whether to grant or deny certification if the Regional Administrator determines that such a hearing is necessary or appropriate.

§ 121.24 Certification.

If, after considering the complete description, the record of a hearing, if any, held pursuant to § 121.23, and such other information and data as the Regional Administrator deems relevant, the Regional Administrator determines that there is reasonable assurance that the proposed activity will not result in a violation of applicable water quality standards, he shall so certify. If the Regional Administrator determines that no water quality standards are applicable to the waters which might be affected by the proposed activity, he shall so notify the applicant and the licensing or permitting agency in writing and shall provide the licensing or permitting agency with advice, suggestions, and recommendations with respect to conditions to be incorporated in any license or permit to achieve compliance with the purpose of this Act. In such case, no certification shall be required.

§ 121.25 Adoption of new water quality standards.

(a) In any case where:

(1) A license or permit was issued without certification due to the absence of applicable water quality standards; and

(2) Water quality standards applicable to the waters into which the licensed or permitted activity may discharge are subsequently established; and

(3) The Administrator is the certifying agency because:

(i) No State or interstate agency has authority to certify; or

(ii) Such new standards were promulgated by the Administrator pursuant to section 10(c)(2) of the Act; and

(4) The Regional Administrator determines that such uncertified activity is violating water quality standards;

Then the Regional Administrator shall notify the licensee or permittee of such violation, including his recommendations as to actions necessary for compliance. If the licensee or permittee fails within 6 months of the date of such notice to take action which in the opinion of the Regional Administrator will result in compliance with applicable water quality standards, the Regional Administrator shall notify the licensing or permitting agency that the licensee or permittee has failed, after reasonable notice, to comply with such standards and that suspension of the applicable license or permit is required by section 21(b)(9)(B) of the Act.

(b) Where a license or permit is suspended pursuant to paragraph (a) of this section, and where the licensee or permittee subsequently takes action which in the Regional Administrator's opinion will result in compliance with applicable water quality standards, the Regional Administrator shall then notify the licensing or permitting agency that there is reasonable assurance that the licensed or permitted activity will comply with applicable water quality standards.

§ 121.26 Inspection of facility or activity before operation.

Where any facility or activity has received certification pursuant to § 121.24 in connection with the issuance of a license or permit for construction, and where such facility or activity is not required to obtain an operating license or permit, the Regional Administrator or his representative, prior to the initial operation of such facility or activity, shall be afforded the opportunity to inspect such facility or activity for the purpose of determining if the manner in which such facility or activity will be operated or conducted will violate applicable water quality standards.

§ 121.27 Notification to licensing or permitting agency.

If the Regional Administrator, after an inspection pursuant to § 121.26, determines that operation of the proposed facility or activity will violate applicable water quality standards, he shall so notify the applicant and the licensing or permitting agency, including his recommendations as to remedial measures necessary to bring the operation of the proposed facility into compliance with such standards.

§ 121.28 Termination of suspension.

Where a licensing or permitting agency, following a public hearing, suspends a license or permit after receiving the Regional Administrator's notice and recommendation pursuant to § 121.27, the applicant may submit evidence to the Regional Administrator that the facility or activity or the operation or conduct thereof has been modified so as not to violate water quality standards. If the Regional Administrator determines that water quality standards will not be violated, he shall so notify the licensing or permitting agency.

Subpart D—Consultations

§ 121.30 Review and advice.

The Regional Administrator may, and upon request shall, provide licensing and permitting agencies with determinations, definitions and interpretations with respect to the meaning and content of water quality standards where they have been federally approved under section 10 of the Act, and findings with respect to the application of all applicable water quality standards in particular cases and in specific circumstances relative to an activity for which a license or permit is sought. The Regional Administrator may, and upon request shall, also advise licensing and permitting agencies as to the status of compliance by dischargers with the conditions and requirements of applicable water quality standards. In cases where an activity for which a license or permit is sought will affect water quality, but for which there are no applicable water quality standards, the Regional Administrator may advise licensing or permitting agencies with respect to conditions of such license or permit to achieve compliance with the purpose of the Act.

PART 122—EPA ADMINISTERED PERMIT PROGRAMS: THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Subpart A—Definitions and General Program Requirements

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122.1 Purpose and scope.
122.2 Definitions.
122.3 Exclusions.
122.4 Prohibitions (applicable to State NPDES Programs, see § 123.25).
122.5 Effect of a permit.
122.6 Continuation of expiring permits.
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Subpart B—Permit Application and Special NPDES Program Requirements

122.21 Application for a permit (applicable to State programs, see § 123.25).
122.22 Signatories to permit applications and reports (applicable to State programs, see § 123.25).
122.23 Concentrated animal feeding operations (applicable to State NPDES programs, see § 123.25).
122.24 Concentrated aquatic animal production facilities (applicable to State NPDES programs, see § 123.25).
122.25 Aquaculture projects (applicable to State NPDES programs, see § 123.25).
122.26 Storm water discharges (applicable to State NPDES programs, see § 123.25).
122.27 Silvicultural activities (applicable to State NPDES programs, see § 123.25).
122.28 General permits (applicable to State NPDES programs, see § 123.25).
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Subpart C—Permit Conditions

122.41 Conditions applicable to all permits (applicable to State programs, see § 123.25).
122.42 Additional conditions applicable to specified categories of NPDES permits (applicable to State NPDES programs, see § 123.25).
122.43 Establishing permit conditions (applicable to State programs, see § 123.25).
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Sec.
122.45 Calculating NPDES permit conditions (applicable to State NPDES programs, see § 123.25).
122.46 Duration of permits (applicable to State programs, see § 123.25).
122.47 Schedules of compliance.
122.48 Requirements for recording and reporting of monitoring results (applicable to State programs, see § 123.25).
122.49 Considerations under Federal law.
122.50 Disposal of pollutants into wells, into publicly owned treatment works or by land application (applicable to State NPDES programs, see § 123.25).

Subpart D—Transfer, Modification, Revocation and Reissuance, and Termination of Permits

122.61 Transfer of permits (applicable to State programs, see § 123.25).
122.62 Modification or revocation and reissuance of permits (applicable to State programs, see § 123.25).
122.63 Minor modifications of permits.
122.64 Termination of permits (applicable to State programs, see § 123.25).

APPENDIX A—NPDES PRIMARY INDUSTRY CATEGORIES
APPENDIX B—CRITERIA FOR DETERMINING A CONCENTRATED ANIMAL FEEDING OPERATION (§ 122.23)
APPENDIX C—CRITERIA FOR DETERMINING A CONCENTRATED AQUATIC ANIMAL PRODUCTION FACILITY (§ 122.24)
APPENDIX D—NPDES PERMIT APPLICATION TESTING REQUIREMENTS (§ 122.21)

AUTHORITY: The Clean Water Act, 33 U.S.C. 1251 *et seq.*

SOURCE: 48 FR 14153, Apr. 1, 1983, unless otherwise noted.

Subpart A—Definitions and General Program Requirements

§ 122.1 Purpose and scope.

(a) *Coverage.* (1) These regulations contain provisions for the *National Pollutant Discharge Elimination System* (NPDES) Program under section 318, 402, and 405 of the *Clean Water Act* (CWA) (Pub. L. 92-500, as amended by Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483, Pub. L. 97-117, and Pub. L. 100-4; 33 U.S.C.1251 *et seq.*)

(2) These regulations cover basic EPA permitting requirements (Part 122), what a State must do to obtain approval to operate its program in lieu of a Federal program and minimum requirements for administering the approved State program (Part 123), and procedures for EPA processing of permit applications and appeals (Part 124). Part 124 is also applicable to other EPA permitting programs, as detailed in that part.

(b) *Scope of the NPDES permit requirement.* (1) The NPDES program requires permits for the discharge of "pollutants" from any "point source" into "waters of the United States." The terms "pollutant", "point source" and "waters of the United States" are defined in § 122.2.

(2) The following are point sources requiring NPDES permits for discharges:

(i) Concentrated animal feeding operations as defined in § 122.23;

(ii) Concentrated aquatic animal production facilities as defined in § 122.24;

(iii) Discharges into aquaculture projects as set forth in § 122.25;

(iv) Discharges from separate storm sewers as set forth in § 122.26; and

(v) Silvicultural point sources as defined in § 122.27.

(3) The permit program established under this Part also applies to owners or operators of any treatment works treating domestic sewage, whether or not the treatment works is otherwise required to obtain an NPDES permit in accordance with paragraph (a)(1) of this section, unless all requirements implementing section 405(d) of CWA applicable to the treatment works treating domestic sewage are included in a permit issued under the appropriate provisions of subtitle C of the Solid Waste Disposal Act, Part C of the Safe Drinking Water Act, the Marine Protection, Research, and Sanctuaries Act of 1972, or the Clean Air Act, or under State permit programs approved by the Administrator as adequate to assure compliance with section 405 of the CWA.

(4) The Regional Administrator may designate any person subject to the standards for sewage sludge use and disposal as a "treatment works treating domestic sewage" as defined in § 122.1, where he or she finds that a permit is necessary to protect public health and the environment from the adverse effects of sewage sludge or to ensure compliance with the technical

standards for sludge use and disposal developed under CWA section 405(d). Any person designated as "treatment works treating domestic sewage" shall submit an application for a permit under § 122.21 within 120 days of being notified by the Regional Administrator that a permit is required. The Regional Administrator's decision to designate a person as a "treatment works treating domestic sewage" under this paragraph shall be stated in the fact sheet or statement of basis for the permit.

(c) *State programs.* Certain requirements set forth in Part 122 and 124 are made applicable to approved State programs by reference in Part 123. These references are set forth in § 123.25. If a section or paragraph of Part 122 or 124 is applicable to States, through reference in § 123.25, that fact is signaled by the following words at the end of the section or paragraph heading: (*Applicable to State programs, see § 123.25*). If these words are absent, the section (or paragraph) applies only to EPA administered permits.

(d) *Relation to other requirements*—(1) *Permit application forms.* Applicants for EPA issued permits must submit their applications on EPA's permit application forms when available. Most of the information requested on these application forms is required by these regulations. The basic information required in the general form (Form 1) and the additional information required for NPDES applications (Forms 2 a through d) are listed in § 122.21. Applicants for State issued permits must use State forms which must require at a minimum the information listed in these sections.

(2) *Technical Regulations.* The NPDES permit program has separate additional regulations. These separate regulations are used by permit issuing authorities to determine what requirements must be placed in permits if they are issued. These separate regulations are located at 40 CFR Parts 125, 129, 133, 136, 40 CFR Subchapter N (Parts 400 through 460), and 40 CFR Part 503.

(e) *Public participation.* This rule establishes the requirements for public participation in EPA and State permit issuance and enforcement and related variance proceedings, and in the approval of State NPDES programs. These requirements carry out the purposes of the public participation requirements of 40 CFR Part 25 (Public Participation), and supersede the requirements of that part as they apply to actions covered under Parts 122, 123, and 124.

(f) *State authorities.* Nothing in Part 122, 123, or 124 precludes more stringent State regulation of any activity covered by these regulations, whether or not under an approved State program.

(g) *Authority.* (1) Section 301(a) of CWA provides that "Except as in compliance with this section and sections 302, 306, 307, 318, 402, and 404 of this Act, the discharge of any pollutant by any person shall be unlawful."

(2) Section 402(a)(1) of CWA provides in part that "The Administrator may, after opportunity for public hearing, issue a permit for the discharge of any pollutant, or combination of pollutants, * * * upon condition that such discharge will meet either all applicable requirements under sections 301, 302, 306, 307, 308, and 403 of this Act, or prior to the taking of necessary implementing actions relating to all such requirements, such conditions as the Administrator determines are necessary to carry out the provisions of this Act."

(3) Section 318(a) of CWA provides that "The Administrator is authorized, after public hearings, to permit the discharge of a specific pollutant or pollutants under controlled conditions associated with an approved aquaculture project under Federal or State supervision pursuant to section 402 of this Act."

(4) Section 405 of CWA provides, in part, that "Where the disposal of sewage sludge resulting from the operation of a treatment works as defined in section 212 of this Act (including the removal of in-place sewage sludge from one location and its deposit at another location) would result in any pollutant from such sewage sludge entering the navigable waters, such disposal is prohibited except in accordance with a permit issued by the Ad-

ministrator under section 402 of this Act."

(5) Section 405(d)(4) of the CWA requires the Administrator, prior to promulgation of standards for sewage sludge use and disposal, to "impose conditions in permits issued to publicly owned treatment works under section 402 of this Act, or take such other measures as the Administrator deems appropriate to protect public health and the environment from any adverse effects which may occur from toxic pollutants in sewage sludge."

(6) Section 405(f) provides that NPDES permits must include requirements implementing the standards for sludge use and disposal (40 CFR Part 503) "unless such requirements have been included in a permit issued under the appropriate provisions of subtitle C of the Solid Waste Disposal Act, part C of the Safe Drinking Water Act, the Marine Protection, Research, and Sanctuaries Act of 1972, or the Clean Air Act, or under State permit programs approved by the Administrator * * *." Section 405(f) also authorizes the Administrator to issue permits with requirements for sludge use or disposal that assure compliance with 40 CFR Part 503 to any treatment works treating domestic sewage that is not subject to NPDES (i.e., has no point source discharge) and has not been issued a permit that includes applicable 40 CFR Part 503 standards under the other permit programs listed in section 405(f)(1) of the CWA.

(7) Sections 402(b), 318 (b) and (c), and 405 (c) and (f) of CWA authorize EPA approval of State permit programs for discharges from point sources, discharges to aquaculture projects, and use and disposal of sewage sludge.

(8) Section 304(i) of CWA provides that the Administrator shall promulgate guidelines establishing uniform application forms and other minimum requirements for the acquisition of information from dischargers in approved States and establishing minimum procedural and other elements of approved State NPDES programs.

(9) Section 501(a) of CWA provides that "The Administrator is authorized to prescribe such regulations as are necessary to carry out his functions under this Act."

(10) Section 101(e) of CWA provides that "Public participation in the development, revision, and enforcement of any regulation, standard, effluent limitation, plan, or program established by the Administrator or any State under this Act shall be provided for, encouraged, and assisted by the Administrator and the States. The Administrator, in cooperation with the States, shall develop and publish regulations specifying minimum guidelines for public participation in such processes."

[48 FR 14153, Apr. 1, 1983, as amended at 54 FR 18781, May 2, 1989]

§ 122.2 Definitions.

The following definitions apply to Parts 122, 123, and 124. Terms not defined in this section have the meaning given by CWA. When a defined term appears in a definition, the defined term is sometimes placed in quotation marks as an aid to readers.

Administrator means the Administrator of the United States Environmental Protection Agency, or an authorized representative.

Applicable standards and limitations means all State, interstate, and federal standards and limitations to which a "discharge," a "sewage sludge use or disposal practice," or a related activity is subject under the CWA, including "effluent limitations," water quality standards, standards of performance, toxic effluent standards or prohibitions, "best management practices," pretreatment standards, and "standards for sewage sludge use or disposal" under sections 301, 302, 303, 304, 306, 307, 308, 403 and 405 of CWA.

Application means the EPA standard national forms for applying for a permit, including any additions, revisions or modifications to the forms; or forms approved by EPA for use in "approved States," including any approved modifications or revisions.

Approved program or *approved State* means a State or interstate program which has been approved or authorized by EPA under Part 123.

Average monthly discharge limitation means the highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

Average weekly discharge limitation means the highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week.

Best management practices ("BMPs") means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of "waters of the United States." BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

BMPs means "best management practices."

Class I sludge management facility means any POTW identified under 40 CFR 403.8(a) as being required to have an approved pretreatment program (including such POTWs located in a State that has elected to assume local program responsibilities pursuant to 40 CFR 403.10(e)) and any other treatment works treating domestic sewage classified as a Class I sludge management facility by the Regional Administrator, or, in the case of approved State programs, the Regional Administrator in conjunction with the State Director, because of the potential for its sludge use or disposal practices to adversely affect public health and the environment.

Contiguous zone means the entire zone established by the United States under Article 24 of the Convention on the Territorial Sea and the Contiguous Zone.

Continuous discharge means a "discharge" which occurs without interruption throughout the operating hours of the facility, except for infrequent shutdowns for maintenance, process changes, or other similar activities.

CWA means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub. L. 92-500, as amended by Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483 and Pub. L. 97-117, 33 U.S.C. 1251 *et seq.*

CWA and regulations means the Clean Water Act (CWA) and applicable regulations promulgated thereunder. In the case of an approved State program, it includes State program requirements.

Daily discharge means the "discharge of a pollutant" measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

Direct discharge means the "discharge of a pollutant."

Director means the Regional Administrator or the State Director, as the context requires, or an authorized representative. When there is no "approved State program," and there is an EPA administered program, "Director" means the Regional Administrator. When there is an approved State program, "Director" normally means the State Director. In some circumstances, however, EPA retains the authority to take certain actions even when there is an approved State program. (For example, when EPA has issued an NPDES permit prior to the approval of a State program, EPA may retain jurisdiction over that permit after program approval, see § 123.1.) In such cases, the term "Director" means the Regional Administrator and not the State Director.

Discharge when used without qualification means the "discharge of a pollutant."

Discharge of a pollutant means:

(a) Any addition of any "pollutant" or combination of pollutants to "waters of the United States" from any "point source," or

(b) Any addition of any pollutant or combination of pollutants to the waters of the "contiguous zone" or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation.

This definition includes additions of pollutants into waters of the United States from: surface runoff which is collected or channelled by man; discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other person which do not lead to a treatment works; and discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works. This term does not include an addition of pollutants by any "indirect discharger."

Discharge Monitoring Report ("DMR") means the EPA uniform national form, including any subsequent additions, revisions, or modifications for the reporting of self-monitoring results by permittees. DMRs must be used by "approved States" as well as by EPA. EPA will supply DMRs to any approved State upon request. The EPA national forms may be modified to substitute the State Agency name, address, logo, and other similar information, as appropriate, in place of EPA's.

DMR means "Discharge Monitoring Report."

Draft permit means a document prepared under § 124.6 indicating the Director's tentative decision to issue or deny, modify, revoke and reissue, terminate, or reissue a "permit." A notice of intent to terminate a permit, and a notice of intent to deny a permit, as discussed in § 124.5, are types of "draft permits." A denial of a request for modification, revocation and reissuance, or termination, as discussed in § 124.5, is not a "draft permit." A "proposed permit" is not a "draft permit."

Effluent limitation means any restriction imposed by the Director on quantities, discharge rates, and concentrations of "pollutants" which are "discharged" from "point sources" into "waters of the United States," the waters of the "contiguous zone," or the ocean.

Effluent limitations guidelines means a regulation published by the Administrator under section 304(b) of CWA to adopt or revise "effluent limitations."

Environmental Protection Agency ("EPA") means the United States Environmental Protection Agency.

EPA means the United States "Environmental Protection Agency."

Facility or activity means any NPDES "point source" or any other facility or activity (including land or appurtenances thereto) that is subject to regulation under the NPDES program.

General permit means an NPDES "permit" issued under § 122.28 authorizing a category of discharges under the CWA within a geographical area.

Hazardous substance means any substance designated under 40 CFR Part 116 pursuant to section 311 of CWA.

Indirect discharger means a nondomestic discharger introducing "pollutants" to a "publicly owned treatment works."

Interstate agency means an agency of two or more States established by or under an agreement or compact approved by the Congress, or any other agency of two or more States having substantial powers or duties pertaining to the control of pollution as determined and approved by the Administrator under the CWA and regulations.

Major facility means any NPDES "facility or activity" classified as such by the Regional Administrator, or, in the case of "approved State programs," the Regional Administrator in conjunction with the State Director.

Maximum daily discharge limitation means the highest allowable "daily discharge."

Municipality means a city, town, borough, county, parish, district, association, or other public body created by or under State law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved managment agency under section 208 of CWA.

National Pollutant Discharge Elimination System (NPDES) means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of CWA. The term includes an "approved program."

New discharger means any building, structure, facility, or installation:

(a) From which there is or may be a "discharge of pollutants;"

(b) That did not commence the "discharge of pollutants" at a particular "site" prior to August 13, 1979;

(c) Which is not a "new source;" and

(d) Which has never received a finally effective NDPES permit for discharges at that "site."

This definition includes an "indirect discharger" which commences discharging into "waters of the United States" after August 13, 1979. It also includes any existing mobile point source (other than an offshore or coastal oil and gas exploratory drilling rig or a coastal oil and gas developmental drilling rig) such as a seafood processing rig, seafood processing vessel, or aggregate plant, that begins discharging at a "site" for which it does not have a permit; and any offshore or coastal mobile oil and gas exploratory drilling rig or coastal mobile oil and gas developmental drilling rig that commences the discharge of pollutants after August 13, 1979, at a "site" under EPA's permitting jurisdiction for which it is not covered by an individual or general permit and which is located in an area determined by the Regional Administrator in the issuance of a final permit to be an area or biological concern. In determining whether an area is an area of biological concern, the Regional Administrator shall consider the factors specified in 40 CFR 125.122(a) (1) through (10).

An offshore or coastal mobile exploratory drilling rig or coastal mobile developmental drilling rig will be considered a "new discharger" only for the duration of its discharge in an area of biological concern.

New source means any building, structure, facility, or installation from which there is or may be a "discharge of pollutants," the construction of which commenced:

(a) After promulgation of standard of performance under section 306 o CWA which are applicable to suc source, or

(b) After proposal of standards o performance in accordance with se tion 306 of CWA which are applicabl to such source, but only if the stand ards are promulgated in accordanc with section 306 within 120 days o their proposal.

NPDES means "National Pollutan Discharge Elimination System."

Owner or operator means the owne or operator of any "facility or activi ty" subject to regulation under th NPDES program.

Permit means an authorization, l cense, or equivalent control documen issued by EPA or an "approved State to implement the requirements of thi part and Parts 123 and 124. "Permit includes an NPDES "general permit (§ 122.28). Permit does not include an permit which has not yet been th subject of final agency action, such a a "draft permit" or a "propose permit."

Person means an individual, associa tion, partnership, corporation, munic pality, State or Federal agency, or a agent or employee thereof.

Point source means any discernibl confined, and discrete conveyance, in cluding but not limited to, any pip ditch, channel, tunnel, conduit, wel discrete fissure, container, rollin stock, concentrated animal feeding op eration, landfill leachate collectio system, vessel or other floating craf from which pollutants are or may b discharged. This term does not includ return flows from irrigated agricultur or agricultural storm water runof (See § 122.3).

Pollutant means dredged spoil, soli waste, incinerator residue, filter back wash, sewage, garbage, sewage sludg munitions, chemical wastes, biologica materials, radioactive materia (except those regulated under th Atomic Energy Act of 1954, as amen ed (42 U.S.C. 2011 *et seq.*)), hea wrecked or discarded equipment, rock sand, cellar dirt and industrial, munic pal, and agricultural waste discharge into water. It does not mean:

(a) Sewage from vessels; or

(b) Water, gas, or other material which is injected into a well to facilitate production of oil or gas, or water derived in association with oil and gas production and disposed of in a well, if the well used either to facilitate production or for disposal purposes is approved by authority of the State in which the well is located, and if the State determines that the injection or disposal will not result in the degradation of ground or surface water resources.

NOTE: Radioactive materials covered by the Atomic Energy Act are those encompassed in its definition of source, byproduct, or special nuclear materials. Examples of materials not covered include radium and accelerator-produced isotopes. See *Train* v. *Colorado Public Interest Research Group, Inc.*, 426 U.S. 1 (1976).

POTW means "publicly owned treatment works."

Primary industry category means any industry category listed in the NRDC settlement agreement (*Natural Resources Defense Council et al.* v. *Train*, 8 E.R.C. 2120 (D.D.C. 1976), *modified* 12 E.R.C. 1833 (D.D.C. 1979)); also listed in Appendix A of Part 122.

Privately owned treatment works means any device or system which is (a) used to treat wastes from any facility whose operator is not the operator of the treatment works and (b) not a "POTW."

Process wastewater means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product.

Proposed permit means a State NPDES "permit" prepared after the close of the public comment period (and, when applicable, any public hearing and administrative appeals) which is sent to EPA for review before final issuance by the State. A "proposed permit" is not a "draft permit."

Publicly owned treatment works ("POTW") means any device or system used in the treatment (including recycling and reclamation) of municipal sewage or industrial wastes of a liquid nature which is owned by a "State" or "municipality." This definition includes sewers, pipes, or other conveyances only if they convey wastewater to a POTW providing treatment.

Recommencing discharger means a source which recommences discharge after terminating operations.

Regional Administrator means the Regional Administrator of the appropriate Regional Office of the Environmental Protection Agency or the authorized representative of the Regional Administrator.

Schedule of compliance means a schedule of remedial measures included in a "permit", including an enforceable sequence of interim requirements (for example, actions, operations, or milestone events) leading to compliance with the CWA and regulations.

Secondary industry category means any industry category which is not a "primary industry category."

Secretary means the Secretary of the Army, acting through the Chief of Engineers.

Septage means the liquid and solid material pumped from a septic tank, cesspool, or similar domestic sewage treatment system, or a holding tank when the system is cleaned or maintained.

Sewage from vessels means human body wastes and the wastes from toilets and other receptacles intended to receive or retain body wastes that are discharged from vessels and regulated under section 312 of CWA, except that with respect to commercial vessels on the Great Lakes this term includes graywater. For the purposes of this definition, "graywater" means galley, bath, and shower water.

Sewage Sludge means any solid, semi-solid, or liquid residue removed during the treatment of municipal waste water or domestic sewage. Sewage sludge includes, but is not limited to, solids removed during primary, secondary, or advanced waste water treatment, scum, septage, portable toilet pumpings, type III marine sanitation device pumpings (33 CFR Part 159), and sewage sludge products. Sewage sludge does not include grit or screenings, or ash generated during the incineration of sewage sludge.

Sewage sludge use or disposal practice means the collection, storage, treatment, transportation, processing, monitoring, use, or disposal of sewage sludge.

Site means the land or water area where any "facility or activity" is physically located or conducted, including adjacent land used in connection with the facility or activity.

Sludge-only facility means any "treatment works treating domestic sewage" whose methods of sewage sludge use or disposal are subject to regulations promulgated pursuant to section 405(d) of the CWA, and is required to obtain a permit under § 122.1(b)(3) of this Part.

Standards for sewage sludge use or disposal means the regulations promulgated pursuant to section 405(d) of the CWA which govern minimum requirements for sludge quality, management practices, and monitoring and 6reporting applicable to sewage sludge or the use or disposal of sewage sludge by any person.

State means any of the 50 States, the District of Columbia, Guam, the Commonwealth of Puerto Rico, the Virgin Islands, American Samoa, the Commonwealth of the Northern Mariana Islands, and the Trust Territory of the Pacific Islands.

State Director means the chief administrative officer of any State or interstate agency operating an "approved program," or the delegated representative of the State Director. If responsibility is divided among two or more State or interstate agencies, "State Director" means the chief administrative officer of the State or interstate agency authorized to perform the particular procedure or function to which reference is made.

State/EPA Agreement means an agreement between the Regional Administrator and the State which coordinates EPA and State activities, responsibilities and programs including those under the CWA programs.

Total dissolved solids means the total dissolved (filterable) solids as determined by use of the method specified in 40 CFR Part 136.

Toxic pollutant means any pollutant listed as toxic under section 307(a)(1) or, in the case of "sludge use or disposal practices," any pollutant identified in regulations implementing section 405(d) of the CWA.

Treatment works treating domestic sewage means a POTW or any other sewage sludge or waste water treatment devices or systems, regardless of ownership (including federal facilities), used in the storage, treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated for the disposal of sewage sludge. This definition does not include septic tanks or similar devices. For purposes of this definition, "domestic sewage" includes waste and waste water from humans or household operations that are discharged to or otherwise enter a treatment works. In States where there is no approved State sludge management program under section 405(f) of the CWA, the Regional Administrator may designate any person subject to the standards for sewage sludge use and disposal in 40 CFR Part 503 as a "treatment works treating domestic sewage," where he or she finds that there is a potential for adverse effects on public health and the environment from poor sludge quality or poor sludge handling, use or disposal practices, or where he or she finds that such designation is necessary to ensure that such person is in compliance with 40 CFR Part 503.

Variance means any mechanism or provision under section 301 or 316 of CWA or under 40 CFR Part 125, or in the applicable "effluent limitations guidelines" which allows modification to or waiver of the generally applicable effluent limitation requirements or time deadlines of CWA. This includes provisions which allow the establishment of alternative limitations based on fundamentally different factors or on sections 301(c), 301(g), 301(h), 301(i), or 316(a) of CWA.

Waters of the United States or *waters of the U.S.* means:

(a) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

(b) All interstate waters, including interstate "wetlands;"

(c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:

(1) Which are or could be used by interstate or foreign travelers for recreational or other purposes;

(2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

(3) Which are used or could be used for industrial purposes by industries in interstate commerce;

(d) All impoundments of waters otherwise defined as waters of the United States under this definition;

(e) Tributaries of waters identified in paragraphs (a) through (d) of this definition;

(f) The territorial sea; and

(g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition) are not waters of the United States. This exclusion applies only to manmade bodies of water which neither were originally created in waters of the United States (such as disposal area in wetlands) nor resulted from the impoundment of waters of the United States. [See Note 1 of this section.]

Wetlands means those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Whole effluent toxicity means the aggregate toxic effect of an effluent measured directly by a toxicity test.

NOTE: At 45 FR 48620, July 21, 1980, the Environmental Protection Agency suspended until further notice in § 122.2, the last sentence, beginning "This exclusion applies . . ." in the definition of "Waters of the United States." This revision continues that suspension.[1]

(Clean Water Act (33 U.S.C. 1251 *et seq.*), Safe Drinking Water Act (42 U.S.C. 300f *et seq.*), Clean Air Act (42 U.S.C. 7401 *et seq.*), Resource Conservation and Recovery Act (42 U.S.C. 6901 *et seq.*))

[48 FR 14153, Apr. 1, 1983, as amended at 48 FR 39619, Sept. 1, 1983; 50 FR 6940, 6941, Feb. 19, 1985; 54 FR 254, Jan. 4, 1989; 54 FR 18781, May 2, 1989; 54 FR 23895, June 2, 1989]

§ 122.3 Exclusions.

The following discharges do not require NPDES permits:

(a) Any discharge of sewage from vessels, effluent from properly functioning marine engines, laundry, shower, and galley sink wastes, or any other discharge incidental to the normal operation of a vessel. This exclusion does not apply to rubbish, trash, garbage, or other such materials discharged overboard; nor to other discharges when the vessel is operating in a capacity other than as a means of transportation such as when used as an energy or mining facility, a storage facility or a seafood processing facility, or when secured to a storage facility or a seafood processing facility, or when secured to the bed of the ocean, contiguous zone or waters of the United States for the purpose of mineral or oil exploration or development.

(b) Discharges of dredged or fill material into waters of the United States which are regulated under section 404 of CWA.

(c) The introduction of sewage, industrial wastes or other pollutants into publicly owned treatment works by indirect dischargers. Plans or agreements to switch to this method of disposal in the future do not relieve dischargers of the obligation to have and comply with permits until all discharges of pollutants to waters of the United States are eliminated. (See also § 122.47(b)). This exclusion does not apply to the introduction of pollutants to privately owned treatment works or to other discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other party not leading to treatment works.

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[1] Editorial Note: The words "This revision" refer to the document published at 48 FR 14153, Apr. 1, 1983.

(d) Any discharge in compliance with the instructions of an On-Scene Coordinator pursuant to 40 CFR Part 300 (The National Oil and Hazardous Substances Pollution Contingency Plan) or 33 CFR 153.10(e) (Pollution by Oil and Hazardous Substances).

(e) Any introduction of pollutants from non point-source agricultural and silvicultural activities, including storm water runoff from orchards, cultivated crops, pastures, range lands, and forest lands, but not discharges from concentrated animal feeding operations as defined in § 122.23, discharges from concentrated aquatic animal production facilities as defined in § 122.24, discharges to aquaculture projects as defined in § 122.25, and discharges from silvicultural point sources as defined in § 122.27.

(f) Return flows from irrigated agriculture.

(g) Discharges into a privately owned treatment works, except as the Director may otherwise require under § 122.44(m).

[48 FR 14153, Apr. 1, 1983, as amended at 54 FR 254, 258, Jan. 4, 1989]

§ 122.4 Prohibitions (applicable to State NPDES programs, see § 123.25).

No permit may be issued:

(a) When the conditions of the permit do not provide for compliance with the applicable requirements of CWA, or regulations promulgated under CWA;

(b) When the applicant is required to obtain a State or other appropriate certification under section 401 of CWA and § 124.53 and that certification has not been obtained or waived;

(c) By the State Director where the Regional Administrator has objected to issuance of the permit under § 123.44;

(d) When the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States;

(e) When, in the judgment of the Secretary, anchorage and navigation in or on any of the waters of the United States would be substantially impaired by the discharge;

(f) For the discharge of any radiological, chemical, or biological warfare agent or high-level radioactive waste;

(g) For any discharge inconsistent with a plan or plan amendment approved under section 208(b) of CWA;

(h) For any discharge to the territorial sea, the waters of the contiguous zone, or the oceans in the following circumstances:

(1) Before the promulgation of guidelines under section 403(c) of CWA (for determining degradation of the waters of the territorial seas, the contiguous zone, and the oceans) unless the Director determines permit issuance to be in the public interest; or

(2) After promulgation of guidelines under section 403(c) of CWA, when insufficient information exists to make a reasonable judgment whether the discharge complies with them.

(i) To a new source or a new discharger, if the discharge from its construction or operation will cause or contribute to the violation of water quality standards. The owner or operator of a new source or new discharger proposing to discharge into a water segment which does not meet applicable water quality standards or is not expected to meet those standards even after the application of the effluent limitations required by sections 301(b)(1)(A) and 301(b)(1)(B) of CWA, and for which the State or interstate agency has performed a pollutants load allocation for the pollutant to be discharged, must demonstrate, before the close of the public comment period, that:

(1) There are sufficient remaining pollutant load allocations to allow for the discharge; and

(2) The existing dischargers into that segment are subject to compliance schedules designed to bring the segment into compliance with applicable water quality standards.

[48 FR 14153, Apr. 1, 1983, as amended at 50 FR 6940, Feb. 19, 1985]

§ 122.5 Effect of a permit.

(a) *Applicable to State programs, see § 123.25.* (1) Except for any toxic effluent standards and prohibitions imposed under section 307 of the CWA and "standards for sewage sludge use or disposal" under 405(d) of the CWA, compliance with a permit during its term constitutes compliance, for purposes of enforcement, with sections 301, 302, 306, 307, 318, 403, and 405 (a)-(b) of CWA.However, a permit may be modified, revoked and reissued, or terminated during its term for cause as set forth in §§ 122.62 and 122.64.

(2) Compliance with a permit condition which implements a particular "standard for sewage sludge use or disposal" shall be an affirmative defense in any enforcement action brought for a violation of that "standard for sewage sludge use or disposal" pursuant to sections 405(e) and 309 of the CWA.

(b) *Applicable to State programs, See § 123.25.* The issuance of a permit does not convey any property rights of any sort, or any exclusive privilege.

(c) The issuance of a permit does not authorize any injury to persons or property or invasion of other private rights, or any infringement of State or local law or regulations.

[48 FR 14153, Apr. 1, 1983, as amended at 54 FR 18782, May 2, 1989]

§ 122.6 Continuation of expiring permits.

(a) *EPA permits.* When EPA is the permit-issuing authority, the conditions of an expired permit continue in force under 5 U.S.C. 558(c) until the effective date of a new permit (see § 124.15) if:

(1) The permittee has submitted a timely application under § 122.21 which is a complete (under § 122.21(e)) application for a new permit; and

(2) The Regional Administrator, through no fault of the permittee does not issue a new permit with an effective date under § 124.15 on or before the expiration date of the previous permit (for example, when issuance is impracticable due to time or resource constraints).

(b) *Effect.* Permits continued under this section remain fully effective and enforceable.

(c) *Enforcement.* When the permittee is not in compliance with the conditions of the expiring or expired permit the Regional Administrator may choose to do any or all of the following:

(1) Initiate enforcement action based upon the permit which has been continued;

(2) Issue a notice of intent to deny the new permit under § 124.6. If the permit is denied, the owner or oprator would then be required to cease the activities authorized by the continued permit or be subject to enforcement action for operating without a permit;

(3) Issue a new permit under Part 124 with appropriate conditions; or

(4) Take other actions authorized by these regulations.

(d) *State continuation.* (1) An EPA-issued permit does not continue in force beyond its expiration date under Federal law if at that time a State is the permitting authority. States authorized to administer the NPDES program may continue either EPA or State-issued permits until the effective date of the new permits, if State law allows. Otherwise, the facility or activity is operating without a permit from the time of expiration of the old permit to the effective date of the State-issued new permit.

[48 FR 14153, Apr. 1, 1983, as amended at 50 FR 6940, Feb. 19, 1985]

§ 122.7 Confidentiality of information.

(a) In accordance with 40 CFR Part 2, any information submitted to EPA pursuant to these regulations may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission in the manner prescribed on the application form or instructions or, in the case of other submissions, by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice. If a claim is asserted, the information will be treated in accordance with the procedures in 40 CFR Part 2 (Public Information).

(b) *Applicable to State programs, see § 123.25.* Claims of confidentiality for the following information will be denied:

(1) The name and address of any permit applicant or permittee;

(2) Permit applications, permits, and effluent data.

(c) *Applicable to State programs, see § 123.25.* Information required by NPDES application forms provided by the Director under § 122.21 may not be claimed confidential. This includes information submitted on the forms themselves and any attachments used to supply information required by the forms.

Subpart B—Permit Application and Special NPDES Program Requirements

§ 122.21 Application for a permit (applicable to State programs, see § 123.25).

(a) *Duty to apply.* Any person who discharges or proposes to discharge pollutants or who owns or operates a "sludge-only facility" and who does not have an effective permit, except persons covered by general permits under § 122.28, excluded under § 122.3, or a user of a privately owned treatment works unless the Director requires otherwise under § 122.44(m), shall submit a complete application (which shall include a BMP program if necessary under 40 CFR 125.102) to the Director in accordance with this section and Part 124.

(b) *Who applies?* When a facility or activity is owned by one person but is operated by another person, it is the operator's duty to obtain a permit.

(c)(1) *Time to apply.* Any person proposing a new discharge shall submit an application at least 180 days before the date on which the discharge is to commence, unless permission for a later date has been granted by the Director. Persons proposing a new discharge are encouraged to submit their applications well in advance of the 180 day requirement to avoid delay. See also paragraph (k) of this section.

(2) *Permits under section 405(f) of CWA.* (i) POTWs with currently effective NPDES permits shall submit the application information required by paragraph (d)(3)(ii) of this section with the next application submitted in accordance with paragraph (d) of this section or within 120 days after promulgation of a "standard for sewage sludge use or disposal" applicable to the POTW's sludge use or disposal practice(s), whichever occurs first.

(ii) Any other existing "treatment works treating domestic sewage" not covered under paragraph (c)(2)(i) of this section shall submit an application to the Director within 120 days after promulgation of a "standard for sewage sludge use or disposal" applicable to its sludge use or disposal practice(s) or upon request of the Director prior to the promulgation of an applicable "standard for sewage sludge use or disposal" if the Director determines that a permit is necessary to protect public health and the environment from any potential adverse effects that may occur from toxic pollutants in sewage sludge.

(iii) Any "treatment works treating domestic sewage" that commences operations after promulgation of an applicable "standard for sewage sludge use or disposal" shall submit an application to the Director at least 180 days prior to the date proposed for commencing operations.

(d) *Duty to reapply.* (1) Any POTW with a currently effective permit shall submit a new application at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Director. (The Director shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)

(2) All other permittees with currently effective permits shall submit a new application 180 days before the existing permit expires, except that:

(i) The Regional Administrator may grant permission to submit an application later than the deadline for submission otherwise applicable, but no later than the permit expiration date; and

(3)(i) All applicants for EPA-issued permits, other than POTWs, new sources, and "sludge-only facilities," must complete Forms 1 and either 2b or 2c of the consolidated permit application forms to apply under § 122.21 and paragraphs (f), (g), and (h) of this section.

(ii) In addition to any other applicable requirements in this Part, all POTWs and other "treatment works treating domestic sewage," including "sludge-only facilities," must submit with their applications the information listed at 40 CFR 501.15 (a)(2) within the time frames established in paragraph (c)(2) of this section.

(e) *Completeness.* The Director shall not issue a permit before receiving a complete application for a permit except for NPDES general permits. An application for a permit is complete when the Director receives an application form and any supplemental information which are completed to his or her satisfaction. The completeness of any application for a permit shall be judged independently of the status of any other permit application or permit for the same facility or activity. For EPA administered NPDES programs, an application which is reviewed under § 124.3 is complete when the Director receives either a complete application or the information listed in a notice of deficiency.

(f) *Information requirements.* All applicants for NPDES permits shall provide the following information to the Director, using the application form provided by the Director (additional information required of applicants is set forth in paragraphs (g) through (k) of this section).

(1) The activities conducted by the applicant which require it to obtain an NPDES permit.

(2) Name, mailing address, and location of the facility for which the application is submitted.

(3) Up to four SIC codes which best reflect the principal products or services provided by the facility.

(4) The operator's name, address, telephone number, ownership status, and status as Federal, State, private, public, or other entity.

(5) Whether the facility is located on Indian lands.

(6) A listing of all permits or construction approvals received or applied for under any of the following programs:

(i) Hazardous Waste Management program under RCRA.

(ii) UIC program under SDWA.

(iii) NPDES program under CWA.

(iv) Prevention of Significant Deterioration (PSD) program under the Clean Air Act.

(v) Nonattainment program under the Clean Air Act.

(vi) National Emission Standards for Hazardous Pollutants (NESHAPS) preconstruction approval under the Clean Air Act.

(vii) Ocean dumping permits under the Marine Protection Research and Sanctuaries Act.

(viii) Dredge or fill permits under section 404 of CWA.

(ix) Other relevant environmental permits, including State permits.

(7) A topographic map (or other map if a topographic map is unavailable) extending one mile beyond the property boundaries of the source, depicting the facility and each of its intake and discharge structures; each of its hazardous waste treatment, storage, or disposal facilities; each well where fluids from the facility are injected underground; and those wells, springs, other surface water bodies, and drinking water wells listed in public records or otherwise known to the applicant in the map area. Group II storm water discharges, as defined in § 122.26(b)(3), are exempt from the requirements of paragraph (f) (7) of this section.

(8) A brief description of the nature of the business.

(9) For Group II storm water dischargers (as defined in § 122.26(b) (3)) only, a brief narrative description of:

(i) The drainage area, including an estimate of the size and nature of the area;

(ii) The receiving water; and

(iii) Any treatment applied to the discharge.

(g) *Application requirements for existing manufacturing, commercial, mining, and silvicultural dischargers.* Existing manufacturing, commercial mining, and silvicultural dischargers applying for NPDES permits, except for those facilities subject to the requirements of § 122.21(h), shall provide the following information to the Director, using application forms provided by the Director.

(1) *Outfall location.* The latitude and longitude to the nearest 15 seconds and the name of the receiving water.

(2) *Line drawing.* A line drawing of the water flow through the facility with a water balance, showing oper-

ations contributing wastewater to the effluent and treatment units. Similar processes, operations, or production areas may be indicated as a single unit, labeled to correspond to the more detailed identification under paragraph (g)(3) of this section. The water balance must show approximate average flows at intake and discharge points and between units, including treatment units. If a water balance cannot be determined (for example, for certain mining activities), the applicant may provide instead a pictorial description of the nature and amount of any sources of water and any collection and treatment measures.

(3) *Average flows and treatment.* A narrative identification of each type of process, operation, or production area which contributes wastewater to the effluent for each outfall, including process wastewater, cooling water, and stormwater runoff; the average flow which each process contributes; and a description of the treatment the wastewater receives, including the ultimate disposal of any solid or fluid wastes other than by discharge. Processes, operations, or production areas may be described in general terms (for example, "dye-making reactor", "distillation tower"). For a privately owned treatment works, this information shall include the identity of each user of the treatment works.

(4) *Intermittent flows.* If any of the discharges described in paragraph (g)(3) of this section are intermittent or seasonal, a description of the frequency, duration and flow rate of each discharge occurrence (except for stormwater runoff, spillage or leaks).

(5) *Maximum production.* If an effluent guideline promulgated under section 304 of CWA applies to the applicant and is expressed in terms of production (or other measure of operation), a reasonable measure of the applicant's actual production reported in the units used in the applicable effluent guideline. The reported measure must reflect the actual production of the facility as required by § 122.45(b)(2).

(6) *Improvements.* If the applicant is subject to any present requirements or compliance schedules for construction, upgrading or operation of waste treatment equipment, an identification of the abatement requirement, a description of the abatement project, and a listing of the required and projected final compliance dates.

(7) *Effluent characteristics.* Information on the discharge of pollutants specified in this paragraph. When "quantitative data" for a pollutant are required, the applicant must collect a sample of effluent and analyze it for the pollutant in accordance with analytical methods approved under 40 CFR Part 136. When no analytical method is approved the applicant may use any suitable method but must provide a description of the method. When an applicant has two or more outfalls with substantially identical effluents, the Director may allow the applicant to test only one outfall and report that the quantitative data also apply to the substantially identical outfalls. The requirements in paragraphs (g)(7) (iii) and (iv) of this section that an applicant must provide quantitative data for certain pollutants known or believed to be present do not apply to pollutants present in a discharge solely as the result of their presence in intake water; however, an applicant must report such pollutants as present. Grab samples must be used for pH, temperature, cyanide, total phenols, residual chlorine, oil and grease, and fecal coliform. For all other pollutants, 24-hour composite samples must be used. However, a minimum of one grab sample may be taken for effluents from holding ponds or other impoundments with a retention period greater than 24 hours, and a minimum of one to four (4) grab samples may be taken for storm water discharges depending on the duration of the discharge. One grab sample shall be taken in the first hour (or less) of discharge with one additional grab sample taken in each succeeding hour of discharge up to a minimum of four grab samples for discharges lasting four or more hours. In addition, the Director may waive composite sampling for any outfall for which the applicant demonstrates that the use of an automatic sampler is infeasible and that the minimum of four (4) grab samples will be a representative sample of the effluent being dis-

charged. An applicant is expected to "know or have reason to believe" that a pollutant is present in an effluent based on an evaluation of the expected use, production, or storage of the pollutant, or on any previous analyses for the pollutant. (For example, any pesticide manufactured by a facility may be expected to be present in contaminated storm water runoff from the facility.)

(i)(A) Every applicant must report quantitative data for every outfall for the following pollutants:

Biochemial Oxygen Demand (BOD_5)
Chemical Oxygen Demand
Total Organic Carbon
Total Suspended Solids
Ammonia (as N)
Temperature (both winter and summer)
pH

(B) The Director may waive the reporting requirements for individual point sources or for a particular industry category for one or more of the pollutants listed in paragraph (g)(7)(i)(A) of this section if the applicant has demonstrated that such a waiver is appropriate because information adequate to support issuance of a permit can be obtained with less stringent requirements.

(ii) Each applicant with processes in one or more primary industry category (see Appendix A to Part 122) contributing to a discharge must report quantitative data for the following pollutants in each outfall containing process wastewater:

(A) The organic toxic pollutants in the fractions designated in Table I of Appendix D of this part for the applicant's industrial category or categories unless the applicant qualifies as a small business under paragraph (g)(8) of this section. Table II of Appendix D of this part lists the organic toxic pollutants in each fraction. The fractions result from the sample preparation required by the analytical procedure which uses gas chromotography/mass spectrometry. A determination that an applicant falls within a particular industrial category for the purposes of selecting fractions for testing is not conclusive as to the applicant's inclusion in that category for any other purposes. [See Notes 2, 3, and 4 of this section.]

(B) The pollutants listed in Table III of Appendix D of this part (the toxic metals, cyanide, and total phenols).

(iii)(A) Each applicant must indicate whether it knows or has reason to believe that any of the pollutants in Table IV of Appendix D (certain conventional and nonconventional pollutants) is discharged from each outfall. If an applicable effluent limitations guideline either directly limits the pollutant or, by its express terms, indirectly limits the pollutant through limitations on an indicator, the applicant must report quantitative data. For every pollutant discharged which is not so limited in an effluent limitations guideline, the applicant must either report quantitative data or briefly describe the reasons the pollutant is expected to be discharged.

(B) Each applicant must indicate whether it knows or has reason to believe that any of the pollutants listed in Table II or Table III of Appendix D (the toxic pollutants and total phenols) for which quantitative data are not otherwise required under paragraph (g)(7)(ii) of this section, is discharged from each outfall. For every pollutant expected to be discharged in concentrations of 10 ppb or greater the applicant must report quantitative data. For acrolein, acrylonitrile, 2,4 dinitrophenol, and 2-methyl-4,6 dinitrophenol, where any of these four pollutants are expected to be discharged in concentrations of 100 ppb or greater the applicant must report quantitative data. For every pollutant expected to be discharged in concentrations less than 10 ppb, or in the case of acrolein, acrylonitrile, 2,4 dinitrophenol, and 2-methyl-4,6 dinitrophenol, in concentrations less than 100 ppb, the applicant must either submit quantitative data or briefly describe the reasons the pollutant is expected to be discharged. An applicant qualifying as a small business under paragraph (g)(8) of this section is not required to analyze for pollutants listed in Table II of Appendix D (the organic toxic pollutants).

(iv) Each applicant must indicate whether it knows or has reason to believe that any of the pollutants in Table V of Appendix D of this part (certain hazardous substances and asbestos) are discharged from each outfall. For every pollutant expected to be discharged, the applicant must briefly describe the reasons the pollutant is expected to be discharged, and report any quantitative data it has for any pollutant.

(v) Each applicant must report qualitative data, generated using a screening procedure not calibrated with analytical standards, for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) if it:

(A) Uses or manufactures 2,4,5-trichlorophenoxy acetic acid (2,4,5,-T); 2-(2,4,5-trichlorophenoxy) propanoic acid (Silvex, 2,4,5,-TP); 2-(2,4,5-trichlorophenoxy) ethyl, 2,2-dichloropropionate (Erbon); O,O-dimethyl O-(2,4,5-trichlorophenyl) phosphorothioate (Ronnel); 2,4,5-trichlorophenol (TCP); or hexachlorophene (HCP); or

(B) Knows or has reason to believe that TCDD is or may be present in an effluent.

(8) *Small business exemption.* An applicant which qualifies as a small business under one of the following criteria is exempt from the requirements in paragraph (g)(7)(ii)(A) or (g)(7)(iii)(A) of this section to submit quantitative data for the pollutants listed in Table II of Appendix D of this part (the organic toxic pollutants):

(i) For coal mines, a probable total annual production of less than 100,000 tons per year.

(ii) For all other applicants, gross total annual sales averaging less than $100,000 per year (in second quarter 1980 dollars).

(9) *Used or manufactured toxics.* A listing of any toxic pollutant which the applicant currently uses or manufactures as an intermediate or final product or byproduct. The Director may waive or modify this requirement for any applicant if the applicant demonstrates that it would be unduly burdensome to identify each toxic pollutant and the Director has adequate information to issue the permit.

(10) *Storm water point source exemption.* (i) An applicant that qualifies as a Group II storm water discharger under § 122.26(b)(3) is exempt from the requirements of paragraphs (f)(7) and (g) of this section, unless the Director requests such information.

(ii) For the purpose of paragraph (g)(3) of this section, storm water point sources may estimate the average flow of their discharge and must indicate the rainfall event and the method of estimation that the estimate is based on.

(iii) The Director may require additional information under paragraph (g)(13) of this section, and may request any Group II storm water dischargers to comply with paragraph (g) of this section.

(11) *Biological toxicity tests.* An identification of any biological toxicity tests which the applicant knows or has reason to believe have been made within the last 3 years on any of the applicant's discharges or on a receiving water in relation to a discharge.

(12) *Contract analyses.* If a contract laboratory or consulting firm performed any of the analyses required by paragraph (g)(7) of this section, the identity of each laboratory or firm and the analyses performed.

(13) *Additional information.* In addition to the information reported on the application form, applicants shall provide to the Director, at his or her request, such other information as the Director may reasonably require to assess the discharges of the facility and to determine whether to issue an NPDES permit. The additional information may include additional quantitative data and bioassays to assess the relative toxicity of discharges to aquatic life and requirements to determine the cause of the toxicity.

(h) *Application requirements for manufacturing, commercial, mining and silvicultural facilities which discharge only non-process wastewater.* Except for stormwater discharges, all manufacturing, commercial, mining and silvicultural dischargers applying for NPDES permits which discharge only non-process wastewater not regulated by an effluent limitations guideline or new source performance standard shall provide the following information to the Director, using application forms provided by the Director:

(1) *Outfall location.* Outfall number, latitude and longitude to the nearest 15 seconds, and the name of the receiving water.

(2) *Discharge date* (for new dischargers). Date of expected commencement of discharge.

(3) *Type of waste.* An identification of the general type of waste discharged, or expected to be discharged upon commencement of operations, including sanitary wastes, restaurant or cafeteria wastes, or noncontact cooling water. An identification of cooling water additives (if any) that are used or expected to be used upon commencement of operations, along with their composition if existing composition is available.

(4) *Effluent characteristics.* (i) Quantitative data for the pollutants or parameters listed below, unless testing is waived by the Director. The quantitative data may be data collected over the past 365 days, if they remain representative of current operations, and must include maximum daily value, average daily value, and number of measurements taken. The applicant must collect and analyze samples in accordance with 40 CFR Part 136. Grab samples must be used for pH, temperature, oil and grease, total residual chlorine, and fecal coliform. For all other pollutants, 24-hour composite samples must be used. New dischargers must include estimates for the pollutants or parameters listed below instead of actual sampling data, along with the source of each estimate. All levels must be reported or estimated as concentration and as total mass, except for flow, pH, and temperature.

(A) Biochemical Oxygen Demand (BOD_5).

(B) Total Suspended Solids (TSS).

(C) Fecal Coliform (if believed present or if sanitary waste is or will be discharged).

(D) Total Residual Chlorine (if chlorine is used).

(E) Oil and Grease.

(F) Chemical Oxygen Demand (COD) (if non-contact cooling water is or will be discharged).

(G) Total Organic Carbon (TOC) (if non-contact cooling water is or will be discharged).

(H) Ammonia (as N).

(I) Discharge Flow.

(J) pH.

(K) Temperature (Winter and Summer).

(ii) The Director may waive the testing and reporting requirements for any of the pollutants or flow listed in paragraph (h)(4)(i) of this section if the applicant submits a request for such a waiver before or with his application which demonstrates that information adequate to support issuance of a permit can be obtained through less stringent requirements.

(iii) If the applicant is a new discharger, he must complete and submit Item IV of Form 2e (see § 122.21(h)(4)) by providing quantitative data in accordance with that section no later than two years after commencement of discharge. However, the applicant need not complete those portions of Item IV requiring tests which he has already performed and reported under the discharge monitoring requirements of his NPDES permit.

(iv) The requirements of parts i and iii of this section that an applicant must provide quantitative data or estimates of certain pollutants do not apply to pollutants present in a discharge solely as a result of their presence in intake water. However, an applicant must report such pollutants as present. Net credit may be provided for the presence of pollutants in intake water if the requirements of § 122.45(g) are met.

(5) *Flow.* A description of the frequency of flow and duration of any seasonal or intermittent discharge (except for stormwater runoff, leaks, or spills).

(6) *Treatment system.* A brief description of any system used or to be used.

(7) *Optional information.* Any additional information the applicant wishes to be considered, such as influent data for the purpose of obtaining "net" credits pursuant to § 122.45(g).

(8) *Certification.* Signature of certifying official under § 122.22.

(i) *Application requirements for new and existing concentrated animal feeding operations and aquatic animal production facilities.* New and existing concentrated animal feeding operations (defined in § 122.23) and concentrated aquatic animal production facilities (defined in § 122.24) shall provide the following information to the Director, using the application form provided by the Director:

(1) For concentrated animal feeding operations:

(i) The type and number of animals in open confinement and housed under roof.

(ii) The number of acres used for confinement feeding.

(iii) The design basis for the runoff diversion and control system, if one exists, including the number of acres of contributing drainage, the storage capacity, and the design safety factor.

(2) For concentrated aquatic animal production facilities:

(i) The maximum daily and average monthly flow from each outfall.

(ii) The number of ponds, raceways, and similar structures.

(iii) The name of the receiving water and the source of intake water.

(iv) For each species of aquatic animals, the total yearly and maximum harvestable weight.

(v) The calendar month of maximum feeding and the total mass of food fed during that month.

(j) *Application requirements for new and existing POTWs.* [Reserved]

(k) *Application requirements for new sources and new discharges.* New manufacturing, commercial, mining, and silvicultural dischargers applying for NPDES permits (except for new discharges of stormwater runoff or facilities subject to the requirements of § 122.21(h)) shall provide the following information to the Director, using application forms provided by the Director:

(1) *Expected outfall location.* The latitude and longitude to the nearest 15 seconds and the name of the receiving water.

(2) *Discharge dates.* The expected date of commencement of discharge.

(3) *Flows, sources of pollution, and treatment technologies*—(i) *Expected treatment of wastewater.* Description of the treatment that the wastewater will receive, along with all operations contributing wastewater to the effluent, average flow contributed by each operation, and the ultimate disposal of any solid or liquid wastes not discharged.

(ii) *Line drawing.* A line drawing of the water flow through the facility with a water balance as described in § 122.21(g)(2).

(iii) *Intermittent flows.* If any of the expected discharges will be intermittent or seasonal, a description of the frequency, duration and maximum daily flow rate of each discharge occurrence (except for stormwater runoff, spillage, or leaks).

(4) *Production.* If a new source performance standard promulgated under section 306 of CWA or an effluent limitation guideline applies to the applicant and is expressed in terms of production (or other measure of operation), a reasonable measure of the applicant's expected actual production reported in the units used in the applicable effluent guideline or new source performance standard as required by § 122.45(b)(2) for each of the first three years. Alternative estimates may also be submitted if production is likely to vary.

(5) *Effluent characteristics.* The requirements in paragraphs (h)(4)(i), (ii), and (iii) of this section that an applicant must provide estimates of certain pollutants expected to be present do not apply to pollutants present in a discharge solely as a result of their presence in intake water; however, an applicant must report such pollutants as present. Net credits may be provided for the presence of pollutants in intake water if the requirements of § 122.45(g) are met. All levels (except for discharge flow, temperature, and pH) must be estimated as concentration and as total mass.

(i) Each applicant must report estimated daily maximum, daily average, and source of information for each outfall for the following pollutants or parameters. The Director may waive the reporting requirements for any of these pollutants and parameters if the applicant submits a request for such a waiver before or with his application which demonstrates that information adequate to support issuance of the permit can be obtained through less stringent reporting requirements.

(A) Biochemical Oxygen Demand (BOD).

(B) Chemical Oxygen Demand (COD).

(C) Total Organic Carbon (TOC).

(D) Total Suspended Solids (TSS).

(E) Flow.

(F) Ammonia (as N).

(G) Temperature (winter and summer).

(H) pH.

(ii) Each applicant must report estimated daily maximum, daily average, and source of information for each outfall for the following pollutants, if the applicant knows or has reason to believe they will be present or if they are limited by an effluent limitation guideline or new source performance standard either directly or indirectly through limitations on an indicator pollutant: all pollutants in Table IV of Appendix D of Part 122 (certain conventional and nonconventional pollutants).

(iii) Each applicant must report estimated daily maximum, daily average and source of information for the following pollutants if he knows or has reason to believe that they will be present in the discharges from any outfall:

(A) The pollutants listed in Table III of Appendix D (the toxic metals, in the discharge from any outfall: Total cyanide, and total phenols);

(B) The organic toxic pollutants in Table II of Appendix D (except bis (chloromethyl) ether, dichlorofluoromethane and trichlorofluoromethane). This requirement is waived for applicants with expected gross sales of less than $100,000 per year for the next three years, and for coal mines with expected average production of less than 100,000 tons of coal per year.

(iv) The applicant is required to report that 2,3,7,8 Tetrachlorodibenzo-P-Dioxin (TCDD) may be discharged if he uses or manufactures one of the following compounds, or if he knows or has reason to believe that TCDD will or may be present in an effluent:

(A) 2,4,5-trichlorophenoxy acetic acid (2,4,5-T) (CAS #93-76-5);

(B) 2-(2,4,5-trichlorophenoxy) propanoic acid (Silvex, 2,4,5-TP) (CAS #93-72-1);

(C) 2-(2,4,5-trichlorophenoxy) ethyl 2,2-dichloropropionate (Erbon) (CAS #136-25-4);

(D) 0,0-dimethyl 0-(2,4,5-trichlorophenyl) phosphorothioate (Ronnel) (CAS #299-84-3);

(E) 2,4,5-trichlorophenol (TCP) (CAS #95-95-4); or

(F) Hexachlorophene (HCP) (CAS #70-30-4);

(v) Each applicant must report any pollutants listed in Table V of Appendix D (certain hazardous substances) if he believes they will be present in any outfall (no quantitative estimates are required unless they are already available).

(vi) No later than two years after the commencement of discharge from the proposed facility, the applicant is required to complete and submit Items V and VI of NPDES application Form 2c (see § 122.21(g)). However, the applicant need not complete those portions of Item V requiring tests which he has already performed and reported under the discharge monitoring requirements of his NPDES permit.

(6) *Engineering Report.* Each applicant must report the existence of any technical evaluation concerning his wastewater treatment, along with the name and location of similar plants of which he has knowledge.

(7) *Other information.* Any optional information the permittee wishes to have considered.

(8) *Certification.* Signature of certifying official under § 122.22.

(l) *Special provisions for applications from new sources.* (1) The owner or operator of any facility which may be a new source(as defined in § 122.2) and which is located in a State without an approved NPDES program must comply with the provisions of this paragaraph.

(2)(i) Before beginning any on-site construction as defined in § 122.29, the owner or operator of any facility which may be a new source must submit information to the Regional Administrator so that he or she can determine if the facility is a new source. The Regional Administrator may request any additional information needed to determine whether the facility is a new source.

(ii) The Regional Administrator shall make an initial determination whether the facility is a new source within 30 days of receiving all necessary information under paragraph (k)(2)(i) of this section.

(3) The Regional Administrator shall issue a public notice in accordance with § 124.10 of the new source determination under paragraph (k)(2) of this section. If the Regional Administrator has determined that the facility is a new source, the notice shall state that the applicant must comply with the environmental review requirements of 40 CFR 6.600 *et seq.*

(4) Any interested person may challenge the Regional Administrator's initial new source determination by requesting an evidentiary hearing under Subpart E of Part 124 within 30 days of issuance of the public notice of the initial determination. If all parties to the evidentiary hearing on the determination agree, the Regional Administrator may defer the hearing until after a final permit decision is made, and consolidate the hearing on the determination with any hearing on the permit.

(m) *Variance requests by non-POTWs.* A discharger which is not a publicly owned treatment works (POTW) may request a variance from otherwise applicable effluent limitations under any of the following statutory or regulatory provisions within the times specified in this paragraph:

(1) *Fundamentally different factors.*

(i) A request for a variance based on the presence of "fundamentally different factors" from those on which the effluent limitations guideline was based shall be filed as follows:

(A) For a request from best practicable control technology currently available (BPT), by the close of the public comment period under § 124.10.

(B) For a request from best available technology economically achievable (BAT) and/or best conventional pollutant control technology (BCT), by no later than:

(*1*) July 3, 1989, for a request based on an effluent limitation guideline promulgated before February 4, 1987, to the extent July 3, 1989 is not later than that provided under previously promulgated regulations; or

(*2*) 180 days after the date on which an effluent limitation guideline is published in the FEDERAL REGISTER for a request based on an effluent limitation guideline promulgated on or after February 4, 1987.

(ii) The request shall explain how the requirements of the applicable regulatory and/or statutory criteria have been met.

(2) *Non-conventional pollutants.* A request for a variance from the BAT requirements for CWA section 301(b)(2)(F) pollutants (commonly called "non-conventional" pollutants) pursuant to section 301(c) of CWA because of the economic capability of the owner or operator, or pursuant to section 301(g) of the CWA (provided however that a § 301(g) variance may only be requested for ammonia; chlorine; color; iron; total phenols (4AAP) (when determined by the Administrator to be a pollutant covered by section 301(b)(2)(F)) and any other pollutant which the Administrator lists under section 301(g)(4) of the CWA) must be made as follows:

(i) For those requests for a variance from an effluent limitation based upon an effluent limitation guideline by:

(A) Submitting an initial request to the Regional Administrator, as well as to the State Director if applicable, stating the name of the discharger, the permit number, the outfall number(s), the applicable effluent guideline, and whether the discharger is requesting a section 301(c) or section 301(g) modification or both. This request must have been filed not later than:

(*1*) September 25, 1978, for a pollutant which is controlled by a BAT effluent limitation guideline promulgated before December 27, 1977; or

(*2*) 270 days after promulgation of an applicable effluent limitation guideline for guidelines promulgated after December 27, 1977; and

(B) Submitting a completed request no later than the close of the public comment period under § 124.10 demonstrating that the requirements of § 124.13 and the applicable requirements of Part 125 have been met. Notwithstanding this provision, the complete application for a request under section 301(g) shall be filed 180 days before EPA must make a decision (unless the Regional Division Director establishes a shorter or longer period).

(ii) For those requests for a variance from effluent limitations not based on effluent limitation guidelines, the request need only comply with paragraph (m)(2)(i)(B) of this section and need not be preceded by an initial request under paragraph (m)(2)(i)(A) of this section.

(3) *Delay in construction of POTW.* An extension under CWA section 301(i)(2) of the statutory deadlines in section 301 (b)(1)(A) or (b)(1)(C) of the CWA based on delay in completion of a POTW into which the source is to discharge must have been requested on or before June 26, 1978 or 180 days after the relevant POTW requested an extension under paragraph (n)(2) of this section, whichever is later, but in no event may this date have been later than January 30, 1988. The request shall explain how the requirements of 40 CFR Part 125, Subpart J have been met.

(4) *Innovative technology.* An extension under CWA section 301(k) from the statutory deadline of section 301(b)(2)(A) for best available technology or 301(b)(2)(E) for best conventional pollutant control technology, based on the use of innovative technology may be reqested no later than the close of the public comment period under § 124.10 for the discharger's initial permit requiring compliance with section 301(b)(2)(A) or 301(b)(2)(E). The request shall demonstrate that the requirements of § 124.13 and Part 125, Subpart C have been met.

(5) *Water quality related effluent limitations.* A modification under section 302(b)(2) of requirements under section 302(a) for achieving water quality related effluent limitations may be requested no later than the close of the public comment period under § 124.10 on the permit from which the modification is sought.

(6) *Thermal discharges.* A variance under CWA section 316(a) for the thermal component of any discharge must be filed with a timely application for a permit under this section, except that if thermal effluent limitations are established under CWA section 402(a)(1) or are based on water quality standards the request for a variance may be filed by the close of the public comment period under § 124.10. A copy of the request as required under 40 CFR Part 125, Subpart H, shall be sent simultaneously to the appropriate State or interstate certifying agency as required under 40 CFR Part 125. (See § 124.65 for special procedures for section 316(a) thermal variances.)

(n) *Variance requests by POTWs.* A discharger which is a publicly owned treatment works (POTW) may request a variance from otherwise applicable effluent limitations under any of the following statutory provisions as specified in this paragraph:

(1) *Discharges into marine waters.* A request for a modification under CWA section 301(h) of requirements of CWA section 301(b)(1)(B) for discharges into marine waters must be filed in accordance with the requirements of 40 CFR Part 125, Subpart G.

(2) *Delay in construction.* An extension under CWA section 301(i)(1) of the statutory deadlines in CWA section 301 (b)(1)(B) or (b)(1)(C) based on delay in the construction of the POTW must have been requested on or before August 3, 1987.

(3) *Water quality based effluent limitation.* A modification under CWA section 302(b)(2) of the requirements under section 302(a) for achieving water quality based effluent limitations shall be requested no later than the close of the public comment period under § 124.10 on the permit from which the modification is sought.

(o) *Expedited variance procedures and time extensions.* (1) Notwithstanding the time requirements in paragraphs (m) and (n) of this section, the Director may notify a permit applicant before a draft permit is issued under § 124.6 that the draft permit will likely contain limitations which are eligible for variances. In the notice the Director may require the applicant as a condition of consideration of any potential variance request to submit a request explaining how the requirements of Part 125 applicable to the variance have been met and may require its submission within a specified reasonable time after receipt of the notice. The notice may be sent before the permit application has been submitted. The draft or final permit may contain the alternative limitations which may become effective upon final grant of the variance.

(2) A discharger who cannot file a timely complete request required under paragraph (m)(2)(i)(B) or (m)(2)(ii) of this section may request an extension. The extension may be granted or denied at the discretion of the Director. Extensions shall be no more than 6 months in duration.

(p) *Recordkeeping*. Except for information required by paragraph (d)(3)(ii) of this section, which shall be retained for a period of at least five years from the date the application is signed (or longer as required by 40 CFR Part 503), applicants shall keep records of all data used to complete permit applications and any supplemental information submitted under this section for a period of at least 3 years from the date the application is signed.

[Note 1: At 46 FR 2046, Jan. 8, 1981, the Environmental Protection Agency suspended until further notice § 122.21(g)(7)(ii)(A) and the corresponding portions of Item V-C of the NPDES application Form 2c as they apply to coal mines. This revision continues that suspension.][1]

[Note 2: At 46 FR 22585, Apr. 20, 1981, the Environmental Protection Agency suspended until further notice § 122.21(g)(7)(ii)(A) and the corresponding portions of Item V-C of the NPDES application Form 2c as they apply to:

a. Testing and reporting for all four organic fractions in the Greige Mills Subcategory of the Textile Mills industry (Subpart C—Low water use processing of 40 CFR Part 410), and testing and reporting for the pesticide fraction in all other subcategories of this industrial category.

b. Testing and reporting for the volatile, base/neutral and pesticide fractions in the Base and Precious Metals Subcategory of the Ore Mining and Dressing industry (Subpart B of 40 CFR Part 440), and testing and reporting for all four fractions in all other subcategories of this industrial category.

c. Testing and reporting for all four GC/MS fractions in the Porcelain Enameling industry.

This revision continues that suspension.][1]

[Note 3: At 46 FR 35090, July 1, 1981, the Environmental Protection Agency suspended until further notice §122.21(g)(7)(ii)(A) and the corresponding portions of Item V-C of the NPDES application Form 2c as they apply to:

a. Testing and reporting for the pesticide fraction in the Tall Oil Rosin Subcategory (Subpart D) and Rosin-Based Derivatives Subcategory (Subpart F) of the Gum and Wood Chemicals industry (40 CFR Part 454), and testing and reporting for the pesticide and base-neutral fractions in all other subcategories of this industrial category.

b. Testing and reporting for the pesticide fraction in the Leather Tanning and Finishing, Paint and Ink Formulation, and Photographic Supplies industrial categories.

c. Testing and reporting for the acid, base/neutral and pesticide fractions in the Petroleum Refining industrial category.

d. Testing and reporting for the pesticide fraction in the Papergrade Sulfite subcategories (Subparts J and U) of the Pulp and Paper industry (40 CFR Part 430); testing and reporting for the base/neutral and pesticide fractions in the following subcategories: Deink (Subpart Q), Dissolving Kraft (Subpart F), and Paperboard from Waste Paper (Subpart E); testing and reporting for the volatile, base/neutral and pesticide fractions in the following subcategories: BCT Bleached Kraft (Subpart H), Semi-Chemical (Subparts B and C), and Nonintegrated-Fine Papers (Subpart R); and testing and reporting for the acid, base/neutral, and pesticide fractions in the following subcategories: Fine Bleached Kraft (Subpart I), Dissolving Sulfite Pulp (Subpart K), Groundwood-Fine Papers (Subpart O), Market Bleached Kraft (Subpart G), Tissue from Wastepaper (Subpart T), and Nonintegrated-Tissue Papers (Subpart S).

e. Testing and reporting for the base/neutral fraction in the Once-Through Cooling Water, Fly Ash and Bottom Ash Transport Water process wastestreams of the Steam Electric Power Plant industrial category.

This revision continues that suspension.][1]

(Information collection requirements contained in paragraphs (f), (g), (h), (i), and (k) were approved by the Office of Management and Budget under control number 2040-0086)

[48 FR 14153, Apr. 1, 1983, as amended at 49 FR 31842, Aug. 8, 1984; 49 FR 38046, Sept. 26, 1984; 50 FR 6940, 6941, Feb. 19, 1985; 50 FR 35203, Aug. 29, 1985; 51 FR 26991, July 28, 1986; 53 FR 4158, Feb. 12, 1988; 53 FR 33007, Sept. 6, 1988; 54 FR 254, Jan. 4, 1989; 54 FR 18782, May 2, 1989]

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[1] Editorial Note: The words "This revision" refer to the document published at 48 FR 14153, Apr. 1, 1983.

[1] Editorial Note: The words "This revision" refer to the document published at 48 FR 14153, Apr. 1, 1983.

§ 122.22 Signatories to permit applications and reports (applicable to State programs, see § 123.25).

(a) *Applications.* All permit applications shall be signed as follows:

(1) *For a corporation:* by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who perfoms similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

NOTE: EPA does not require specific assignments or delegations of authority to responsible corporate officers identified in § 122.22(a)(1)(i). The Agency will presume that these responsible corporate officers have the requisite authority to sign permit applications unless the corporation has notified the Director to the contrary. Corporate procedures governing authority to sign permit applications may provide for assignment or delegation to applicable corporate positions under § 122.22(a)(1)(ii) rather than to specific individuals.

(2) *For a partnership or sole proprietorship:* by a general partner or the proprietor, respectively; or

(3) *For a municipality, State, Federal, or other public agency:* By either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes: (i) The chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

(b) All reports required by permits, other information requested by the Director, and all permit applications submitted for Group II storm water discharges under § 122.26(b)(3) shall be signed by a person described in paragraph (a) of this section, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in paragraph (a) of this section;

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) and,

(3) The written authorization is submitted to the Director.

(c) *Changes to authorization.* If an authorization under paragraph (b) of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph (b) of this section must be submitted to the Director prior to or together with any reports, information, or applications to be signed by an authorized representative.

(d) *Certification.* Any person signing a document under paragraph (a) or (b) of this section shall make the following certification:

> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

(Clean Water Act (33 U.S.C. 1251 *et seq.*), Safe Drinking Water Act (42 U.S.C. 300f *et seq.*), Clean Air Act (42 U.S.C. 7401 *et seq.*), Resource Conservation and Recovery Act (42 U.S.C. 6901 *et seq.*))

[48 FR 14153, Apr. 1, 1983, as amended at 48 FR 39619, Sept. 1, 1983; 49 FR 38047, Sept. 29, 1984; 50 FR 6941, Feb. 19, 1985]

§ 122.23 Concentrated animal feeding operations (applicable to State NPDES programs, see § 123.25).

(a) *Permit requirement.* Concentrated animal feeding operations are point sources subject to the NPDES permit program.

(b) *Definitions.* (1) "Animal feeding operation" means a lot or facility (other than an aquatic animal production facility) where the following conditions are met:

(i) Animals (other than aquatic animals) have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period, and

(ii) Crops, vegetation forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility.

(2) Two or more animal feeding operations under common ownership are considered, for the purposes of these regulations, to be a single animal feeding operation if they adjoin each other or if they use a common area or system for the disposal of wastes.

(3) "Concentrated animal feeding operation" means an "animal feeding operation" which meets the criteria in Appendix B of this part, or which the Director designates under paragraph (c) of this section.

(c) *Case-by-case designation of concentrated animal feeding operations.* (1) The Director may designate any animal feeding operation as a concentrated animal feeding operation upon determining that it is a significant contributor of pollution to the waters of the United States. In making this designation the Director shall consider the following factors:

(i) The size of the animal feeding operation and the amount of wastes reaching waters of the United States;

(ii) The location of the animal feeding operation relative to waters of the United States;

(iii) The means of conveyance of animal wastes and process waste waters into waters of the United States;

(iv) The slope, vegetation, rainfall, and other factors affecting the likelihood or frequency of discharge of animal wastes and process waste waters into waters of the United States; and

(v) Other relevant factors.

(2) No animal feeding operation with less than the numbers of animals set forth in Appendix B of this part shall be designated as a concentrated animal feeding operation unless:

(i) Pollutants are discharged into waters of the United States through a manmade ditch, flushing system, or other similar manmade device; or

(ii) Pollutants are discharged directly into waters of the United States which originate outside of the facility and pass over, across, or through the facility or otherwise come into direct contact with the animals confined in the operation.

(3) A permit application shall not be required from a concentrated animal feeding operation designated under this paragraph until the Director has conducted an on-site inspection of the operation and determined that the operation should and could be regulated under the permit program.

§ 122.24 Concentrated aquatic animal production facilities (applicable to State NPDES programs, see § 123.25).

(a) *Permit requirement.* Concentrated aquatic animal production facilities, as defined in this section, are point sources subject to the NPDES permit program.

(b) *Defintion.* "Concentrated aquatic animal production facility" means a hatchery, fish farm, or other facility which meets the criteria in Appendix C of this part, or which the Director designates under paragraph (c) of this section.

(c) *Case-by-case designation of concentrated aquatic animal production facilities.* (1) The Director may designate any warm or cold water aquatic animal production facility as a concentrated aquatic animal production facility upon determining that it is a significant contributor of pollution to waters of the United States. In making this designation the Director shall consider the following factors:

(i) The location and quality of the receiving waters of the United States

(ii) The holding, feeding, and production capacities of the facility;

(iii) The quantity and nature of the pollutants reaching waters of the United States; and

(iv) Other relevant factors.

(2) A permit application shall not be required from a concentrated aquatic animal production facility designated under this paragraph until the Director has conducted on-site inspection of the facility and has determined that the facility should and could be regulated under the permit program.

§ 122.25 Aquaculture projects (applicable to State NPDES programs, see § 123.25).

(a) *Permit requirement.* Discharges into aquaculture projects, as defined in this section, are subject to the NPDES permit program through section 318 of CWA, and in accordance with 40 CFR Part 125, Subpart B.

(b) *Definitions.* (1) "Aquaculture project" means a defined managed water area which uses discharges of pollutants into that designated area for the maintenance or production of harvestable freshwater, estuarine, or marine plants or animals.

(2) "Designated project area" means the portions of the waters of the United States within which the permittee or permit applicant plans to confine the cultivated species, using a method or plan or operation (including, but not limited to, physical confinement) which, on the basis of reliable scientific evidence, is expected to ensure that specific individual organisms comprising an aquaculture crop will enjoy increased growth attributable to the discharge of pollutants, and be harvested within a defined geographic area.

§ 122.26 Storm water discharges (applicable to State NPDES programs, see § 123.25).

(a) *Permit requirement.* (1) Prior to October 1, 1992, a permit shall not be required for a discharge composed entirely of storm water, except for:

(i) A discharge with respect to which a permit has been issued prior to February 4, 1987;

(ii) A discharge associated with industrial activity;

(iii) A discharge from a municipal separate storm sewer system serving a population of 250,000 or more;

(iv) A discharge from a municipal separate storm sewer system serving a population of 100,000 or more but less than 250,000;

(v) A discharge which the Administrator or the State, as the case may be, determines contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States.

(2) Permits for discharges from municipal separate storm sewers may be issued on a system or jurisdiction-wide basis.

(3) The Administrator shall not require a permit under this section, nor shall the Administrator directly or indirectly require any State to require a permit for discharges of storm water runoff from mining operations or oil and gas exploration, production, processing, or treatment operations or transmission facilities, composed entirely of flows which are from conveyances or systems of conveyances (including but not limited to pipes, conduits, ditches, and channels) used for collecting and conveying precipitation runoff and which are not contaminated by contact with or do not come into contact with any overburden, raw material, intermediate products, finished product, byproduct, or waste products located on the site of such operations.

(b) [Reserved]

[54 FR 255, Jan. 4, 1989]

§ 122.27 Silvicultural activities (applicable to State NPDES programs, see § 123.25).

(a) *Permit requirement.* Silvicultural point sources, as defined in this section, as point sources subject to the NPDES permit program.

(b) *Definitions.* (1) "Silvicultural point source" means any discernible, confined and discrete conveyance related to rock crushing, gravel washing, log sorting, or log storage facilities which are operated in connection with silvicultural activities and from which pollutants are discharged into waters of the United States. The term does not include non-point source silvicultural activities such as nursery operations, site preparation, reforestation and subsequent cultural treatment, thinning, prescribed burning, pest and fire control, harvesting operations, surface drainage, or road construction and maintenance from which there is natural runoff. However, some of these activities (such as stream crossing for roads) may involve point source discharges of dredged or fill material which may require a CWA section 404 permit (See 33 CFR 209.120 and Part 233).

(2) "Rock crushing and gravel washing facilities" means facilities which process crushed and broken stone, gravel, and riprap (See 40 CFR Part 436, Subpart B, including the effluent limitations guidelines).

(3) "Log sorting and log storage facilities" means facilities whose discharges result from the holding of unprocessed wood, for example, logs or roundwood with bark or after removal of bark held in self-contained bodies of water (mill ponds or log ponds) or stored on land where water is applied intentionally on the logs (wet decking). (See 40 CFR Part 429, Subpart I, including the effluent limitations guidelines).

§ 122.28 General permits (applicable to State NPDES programs, see § 123.25).

(a) *Coverage.* The Director may issue a general permit in accordance with the following:

(1) *Area.* The general permit shall be written to cover a category of discharges or sludge use or disposal practices or facilities described in the permit under paragraph (a)(2)(ii) of this section, except those covered by individual permits, within a geographic area. The area shall correspond to existing geographic or political boundaries, such as:

(i) Designated planning areas under sections 208 and 303 of CWA;

(ii) Sewer districts or sewer authorities;

(iii) City, county, or State political boundaries;

(iv) State highway systems;

(v) Standard metropolitan statistical areas as defined by the Office of Management and Budget;

(vi) Urbanized areas as designated by the Bureau of the Census according to criteria in 30 FR 15202 (May 1, 1974); or

(vii) Any other appropriate division or combination of boundaries.

(2) *Sources.* The general permit may be written to regulate, within the area described in paragraph (a)(1) of this section, either:

(i) Storm water point sources; or

(ii) A category of point sources other than storm water point sources, or a category of "treatment works treating domestic sewage," if the sources or "treatment works treating domestic sewage" all:

(A) Involve the same or substantially similar types of operations;

(B) Discharge the same types of wastes or engage in the same types of sludge use or disposal practices;

(C) Require the same effluent limitations, operating conditions, or standards for sewage sludge use or disposal;

(D) Require the same or similar monitoring; and

(E) In the opinion of the Director are more appropriately controlled under a general permit than under individual permits.

(b) *Administration.* (1) *In general.* General permits may be issued, modified, revoked and reissued, or terminated in accordance with applicable requirements of Part 124 or corresponding State regulations. Special procedures for issuance are found at § 123.44 for States and § 124.58 for EPA.

(2) *Requiring an individual permit.* (i) The Director may require any person authorized by a general permit to apply for and obtain an individual NPDES permit. Any interested person may petition the Director to take action under this paragraph. Cases where an individual NPDES permit may be required include the following:

(A) The discharger is not in compliance with the conditions of the general NPDES permit;

(B) A change has occurred in the availability of demonstrated technology or practices for the control or abatement of pollutants applicable to the point source;

(C) Effluent limitation guidelines are promulgated for point sources covered by the general NPDES permit;

(D) A Water Quality Management plan containing requirements applicable to such point sources is approved; or

(E) The requirements of paragraph (a) of this section are not met.

(ii) *For EPA issued general permits only,* the Regional Administrator may require any owner or operator authorized by a general permit to apply for an individual NPDES permit as provided in paragraph (b)(2)(i) of this section, only if the owner or operator has been notified in writing that a permit application is required. This notice shall include a brief statement of the reasons for this decision, an application form, a statement setting a time for the owner or operator to file the application, and a statement that on the effective date of the individual NPDES permit the general permit as t applies to the individual permittee hall automatically terminate. The Di- ector may grant additional time upon equest of the applicant.

(iii) Any owner or operator authorzed by a general permit may request o be excluded from the coverage of he general permit by applying for an ndividual permit. The owner or opera- or shall submit an application under 122.21, with reasons supporting the equest, to the Director no later than 0 days after the publication by EPA f the general permit in the Federal Register or the publication by a State n accordance with applicable State aw. The request shall be processed nder Part 124 or applicable State pro- edures. The request shall be granted y issuing of any individual permit if he reasons cited by the owner or op- rator are adequate to support the re- uest.

(iv) When an individual NPDES ermit is issued to an owner or opera- or otherwise subject to a general PDES permit, the applicability of ne general permit to the individual PDES permittee is automatically ter- inated on the effective date of the dividual permit.

(v) A source excluded from a general ermit solely because it already has an dividual permit may request that ne individual permit be revoked, and at it be covered by the general ermit. Upon revocation of the individual permit, the general permit shall apply to the source.

(c) *Offshore oil and gas facilities* (Not applicable to State programs). (1) The Regional Administrator shall, except as provided below, issue general permits covering discharges from offshore oil and gas exploration and production facilities within the Region's jurisdiction. Where the offshore area includes areas, such as areas of biological concern, for which separate permit conditions are required, the Regional Administrator may issue separate general permits, individual permits, or both. The reason for separate general permits or individual permits shall be set forth in the appropriate fact sheets or statements of basis. Any statement of basis or fact sheet for a draft permit shall include the Regional Administrator's tentative determination as to whether the permit applies to "new sources," "new dischargers," or existing sources and the reasons for this determination, and the Regional Administrator's proposals as to areas of biological concern subject either to separate individual or general permits. For Federally leased lands, the general permit area should generally be no less extensive than the lease sale area defined by the Department of the Interior.

(2) Any interested person, including any prospective permittee, may petition the Regional Administrator to issue a general permit. Unless the Regional Administrator determines under paragraph (c)(1) of this section that no general permit is appropriate, he shall promptly provide a project decision schedule covering the issuance of the general permit or permits for any lease sale area for which the Department of the Interior has published a draft environmental impact statement. The project decision schedule shall meet the requirements of § 124.3(g), and shall include a schedule providing for the issuance of the final general permit or permits not later than the date of the final notice of sale projected by the Department of the Interior or six months after the date of the request, whichever is later. The Regional Administrator may, at his discretion, issue a project decision

schedule for offshore oil and gas facilities in the territorial seas.

(3) Nothing in this paragraph (c) shall affect the authority of the Regional Administrator to require an individual permit under § 122.28(b)(2)(i)(A) through (F).

(Clean Water Act (33 U.S.C. 1251 *et seq.*), Safe Drinking Water Act (42 U.S.C. 300f *et seq.*), Clean Air Act (42 U.S.C. 7401 *et seq.*), Resource Conservation and Recovery Act (42 U.S.C. 6901 *et seq.*))

[48 FR 14153, Apr. 1, 1983, as amended at 48 FR 39619, Sept. 1, 1983; 49 FR 38048, Sept. 26, 1984; 50 FR 6940, Feb. 19, 1985; 54 FR 258, Jan. 4, 1989; 54 FR 18782, May 2, 1989]

EDITORIAL NOTE: At 54 FR 258, Jan. 4, 1989, § 122.28 was amended by removing paragraph (b)(2)(i)(A) and redesignating the existing paragraphs (B), (C), (D), (E) and (F) as (A), (B), (C), (D) and (E) respectively. At 54 FR 18782, May 2, 1989, § 122.28 was again amended, in part by revising paragraphs (b)(2)(i)(B), (C), and (F). As it is not clear how the second amendment was intended to be handled, the text of these revised paragraphs follows. EPA will publish clarification at a later date.

§ 122.28 General permits (applicable to State NPDES programs, see § 123.25).

* * * * *

(b)* * *

(2)* * *

(i)* * *

(B) The discharger or "treatment works treating domestic sewage" is not in compliance with the conditions of the general NPDES permit;

(C) A change has occurred in the availability of demonstrated technology or practices for the control or abatement of pollutants applicable to the point source or treatment works treating domestic sewage;

* * * * *

(F) Standards for sewage sludge use or disposal have been promulgated for the sludge use and disposal practice covered by the general NPDES permit; or

* * * * *

§ 122.29 New sources and new dischargers.

(a) *Definitions.* (1) "New source" and "new discharger" are defined in § 122.2. [See Note 2.]

(2) "Source" means any building, structure, facility, or installation from which there is or may be a discharge of pollutants.

(3) "Existing source" means any source which is not a new source or a new discharger.

(4) "Site" is defined in § 122.2;

(5) "Facilities or equipment" means buildings, structures, process or production equipment or machinery which form a permanent part of the new source and which will be used in its operation, if these facilities or equipment are of such value as to represent a substantial commitment to construct. It excludes facilities or equipment used in connection with feasibility, engineering, and design studies regarding the source or water pollution treatment for the source.

(b) *Criteria for new source determination.* (1) Except as otherwise provided in an applicable new source performance standard, a source is a "new source" if it meets the definition of "new source" in § 122.2, and

(i) It is constructed at a site at which no other source is located; or

(ii) It totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or

(iii) Its processes are substantially independent of an existing source at the same site. In determining whether these processes are substantially independent, the Director shall consider such factors as the extent to which the new facility is integrated with the existing plant; and the extent to which the new facility is engaged in the same general type of activity as the existing source.

(2) A source meeting the requirements of paragraphs (b)(1) (i), (ii), or (iii) of this section is a new source only if a new source performance standard is independently applicable to it. If there is no such independently applicable standard, the source is a new discharger. See § 122.2.

(3) Construction on a site at which an existing source is located results in a modification subject to § 122.62 rather than a new source (or a new discharger) if the construction does not create a new building, structure, facility, or installation meeting the criteria of paragraph (b)(1) (ii) or (iii) of this section but otherwise alters, re-

laces, or adds to existing process or
roduction equipment.

(4) Construction of a new source as
efined under § 122.2 has commenced
the owner or operator has:

(i) Begun, or caused to begin as part
f a continuous on-site construction
rogram:

(A) Any placement, assembly, or in-
allation of facilities or equipment; or

(B) Significant site preparation work
cluding clearing, excavation or re-
oval of existing buildings, structures,
r facilities which is necessary for the
lacement, assembly, or installation of
ew source facilities or equipment; or

(ii) Entered into a binding contrac-
ual obligation for the purchase of fa-
lities or equipment which are intend-
d to be used in its operation with a
easonable time. Options to purchase
r contracts which can be terminated
r modified without substantial loss,
nd contracts for feasibility engineer-
g, and design studies do not consti-
ute a contractual obligation under
he paragraph.

(c) *Requirement for an environmen-
al impact statement.* (1) The issuance
f an NPDES permit to new source:

(i) By EPA may be a major Federal
ction significantly affecting the qual-
y of the human environment within
he meaning of the National Environ-
ental Policy Act of 1969 (NEPA), 33
.S.C. 4321 *et seq.* and is subject to the
nvironmental review provisions of
EPA as set out in 40 CFR Part 6,
ubpart F. EPA will determine wheth-
r an Environmental Impact State-
ent (EIS) is required under
122.21(k) (special provisions for ap-
lications from new sources) and 40
FR Part 6, Subpart F;

(ii) By an NPDES approved State is
ot a Federal action and therefore
oes not require EPA to conduct an
nvironmental review.

(2) An EIS prepared under this para-
raph shall include a recommendation
ither to issue or deny the permit.

(i) If the recommendation is to deny
he permit, the final EIS shall contain
he reasons for the recommendation
nd list those measures, if any, which
he applicant could take to cause the
ecommendation to be changed;

(ii) If the recommendation is to issue
he permit, the final EIS shall recommend the actions, if any, which the permittee should take to prevent or minimize any adverse environmental impacts;

(3) The Regional Administrator, to the extent allowed by law, shall issue, condition (other than imposing effluent limitations), or deny the new source NPDES permit following a complete evaluation of any significant beneficial and adverse impacts of the proposed action and a review of the recommendations contained in the EIS or finding of no significant impact.

(d) *Effect of compliance with new source performance standards.* (The provisions of this paragraph do not apply to existing sources which modify their pollution control facilities or construct new pollution control facilities and achieve performance standards, but which are neither new sources or new dischargers or otherwise do not meet the requirements of this paragraph.)

(1) Except as provided in paragraph (d)(2) of this section, any new discharger, the construction of which commenced after October 18, 1972, or new source which meets the applicable promulgated new source performance standards before the commencement of discharge, may not be subject to any more stringent new source performance standards or to any more stringent technology-based standards under section 301(b)(2) of CWA for the soonest ending of the following periods:

(i) Ten years from the date that construction is completed;

(ii) Ten years from the date the source begins to discharge process or other nonconstruction related wastewater; or

(iii) The period of depreciation or amortization of the facility for the purposes of section 167 or 169 (or both) of the Internal Revenue Code of 1954.

(2) The protection from more stringent standards of performance afforded by paragraph (d)(1) of this section does not apply to:

(i) Additional or more stringent permit conditions which are not technology based; for example, conditions based on water quality standards, or toxic effluent standards or prohibitions under section 307(a) of CWA; or

(ii) Additional permit conditions in accordance with § 125.3 controlling toxic pollutants or hazardous substances which are not controlled by new source performance standards. This includes permit conditions controlling pollutants other than those identified as toxic pollutants or hazardous substances when control of these pollutants has been specifically identified as the method to control the toxic pollutants or hazardous substances.

(3) When an NPDES permit issued to a source with a "protection period" under paragraph (d)(1) of this section will expire on or after the expiration of the protection period, that permit shall require the owner or operator of the source to comply with the requirements of section 301 and any other then applicable requirements of CWA immediately upon the expiration of the protection period. No additional period for achieving compliance with these requirements may be allowed except when necessary to achieve compliance with requirements promulgated less than 3 years before the expiration of the protection period.

(4) The owner or operator of a new source, a new discharger which commenced discharge after August 13, 1979, or a recommencing discharger shall install and have in operating condition, and shall "start-up" all pollution control equipment required to meet the conditions of its permits before beginning to discharge. Within the shortest feasible time (not to exceed 90 days), the owner or operator must meet all permit conditions. The requirements of this paragraph do not apply if the owner or operator is issued a permit containing a compliance schedule under § 122.47(a)(2).

(5) After the effective date of new source performance standards, it shall be unlawful for any owner or operator of any new source to operate the source in violation of those standards applicable to the source.

(Information collection requirements in paragraph (c)(5) were approved by the Office of Management and Budget under control number 2040-0078)

[48 FR 14153, Apr. 1, 1983, as amended at FR 38048, Sept. 26, 1984; 50 FR 4514, Ja 31, 1985; 50 FR 6941, Feb. 19, 1985; 54 F 255, Jan. 4, 1989]

EDITORIAL NOTE: At 54 FR 255, Jan. 1989, § 122.29 was amended by removin subparagraphs (c) (4) and (5). At 54 FR 2 Jan. 4, 1989, § 122.29 was further amende by correcting (c)(4)(i). For the convenien of the user, the corrected paragraph follo as it had already been removed.

§ 122.29 New sources and new dischargers.

* * * * *

(c)

* * *

(4)(i) No on-site construction of a ne source for which an EIS is required sha commence before final Agency action in i suing a final permit incorporating appropri ate EIS-related requirements, or before ex cution by the applicant of a legally bindi written agreement which requires compli ance with all such requirements, unless suc construction is determined by the Region Administrator not to cause significant or i reversible adverse environmental impac The provisions of any agreement ntere into under this paragraph shall be incorpo rated as conditions of the NPDES perm when it is issued.

* * * * *

Subpart C—Permit Conditions

§ 122.41 Conditions applicable to all pe mits (applicable to State programs, se § 123.25).

The following conditions apply to a NPDES permits. Additional condition applicable to NPDES permits are i § 122.42. All conditions applicable t NPDES permits shall be incorporate into the permits either expressly or b reference. If incorporated by refe ence, a specific citation to these regu lations (or the corresponding approve State regulations) must be given in th permit.

(a) *Duty to comply.* The permitte must comply with all conditions o this permit. Any permit noncompli ance constitutes a violation of th Clean Water Act and is grounds fo enforcement action; for permit termi nation, revocation and reissuance, o modification; or denial of a permit re newal application.

(1) The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.

(2) The Clean Water Act provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed $25,000 per day for each violation. The Clean Water Act provides that any person who *negligently* violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both. Any person who *knowingly* violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

(3) Any person may be assessed an administrative penalty by the Administrator for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.

(b) *Duty to reapply.* If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit.

(c) *Need to halt or reduce activity not a defense.* It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

(d) *Duty to mitigate.* The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

(e) *Proper operation and maintenance.* The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

(f) *Permit actions.* This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

(g) *Property rights.* This permit does not convey any property rights of any sort, or any exclusive privilege.

(h) *Duty to provide information.* The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Director upon request, copies of records required to be kept by this permit.

(i) *Inspection and entry.* The permittee shall allow the Director, or an authorized representative (including an authorized contractor acting as a representative of the Administrator), upon presentation of credentials and other documents as may be required by law, to:

(1) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

(2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

(3) Inspect at reasonable times
facilities, equipment (including m
toring and control equipment), p
tices, or operations regulated or
quired under this permit; and

(4) Sample or monitor at reasona
times, for the purposes of assur
permit compliance or as otherwise
thorized by the Clean Water Act,
substances or parameters at any lo
tion.

(j) *Monitoring and records.* (1) Sa
ples and measurements taken for
purpose of monitoring shall be rep
sentative of the monitored activity.

(2) Except for records of monitor
information required by this per
related to the permittee's sew
sludge use and disposal activiti
which shall be retained for a period
at least five years (or longer as
quired by 40 CFR Part 503), the p
mittee shall retain records of all mo
toring information, including all c
bration and maintenance records a
all original strip chart recordings
continuous monitoring instrumen
tion, copies of all reports required
this permit, and records of all d
used to complete the application
this permit, for a period of at least
years from the date of the samp
measurement, report or applicatio
This period may be extended by
quest of the Director at any time.

(3) Records of monitoring inform
tion shall include:

(i) The date, exact place, and time
sampling or measurements;

(ii) The individual(s) who perform
the sampling or measurements;

(iii) The date(s) analyses were pe
formed;

(iv) The individual(s) who perform
the analyses;

(v) The analytical techniques
methods used; and

(vi) The results of such analyses.

(4) Monitoring results must be co
ducted according to test procedur
approved under 40 CFR Part 136 or,
the case of sludge use or disposal, a
proved under 40 CFR Part 136 unle
otherwise specified in 40 CFR Pa
503, unless other test procedures hav
been specified in the permit.

(5) The Clean Water Act provide
that any person who falsifies, tampe
with, or knowingly renders inaccurat

any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

(k) *Signatory requirement.* (1) All applications, reports, or information submitted to the Director shall be signed and certified. (See § 122.22)

(2) The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

(l) *Reporting requirements.* (1) *Planned changes.* The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

(i) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in § 122.29(b); or

(ii) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under § 122.42(a)(1).

(iii) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan;

(2) *Anticipated noncompliance.* The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

(3) *Transfers.* This permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Clean Water Act. (See § 122.61; in some cases, modification or revocation and reissuance is mandatory.)

(4) *Monitoring reports.* Monitoring results shall be reported at the intervals specified elsewhere in this permit.

(i) Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by the Director for reporting results of monitoring of sludge use or disposal practices.

(ii) If the permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, or as specified in the permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Director.

(iii) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.

(5) *Compliance schedules.* Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

(6) *Twenty-four hour reporting.* (i) The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becames aware of the circumstances. A written submission shall also be pro-

vided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

(ii) The following shall be included as information which must be reported within 24 hours under this paragraph.

(A) Any unanticipated bypass which exceeds any effluent limitation in the permit. (See § 122.41(g).

(B) Any upset which exceeds any effluent limitation in the permit.

(C) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Director in the permit to be reported within 24 hours. (See § 122.44(g).)

(iii) The Director may waive the written report on a case-by-case basis for reports under paragraph (l)(6)(ii) of this section if the oral report has been received within 24 hours.

(7) *Other noncompliance.* The permittee shall report all instances of noncompliance not reported under paragraphs (l) (4), (5), and (6) of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph (l)(6) of this section.

(8) *Other information.* Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, it shall promptly submit such facts or information.

(m) *Bypass*—(1) *Definitions.* (i) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

(ii) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

(2) *Bypass not exceeding limitations.* The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs (m)(3) and (m)(4) of this section.

(3) *Notice*—(i) *Anticipated bypass.* If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.

(ii) *Unanticipated bypass.* The permittee shall submit notice of an unanticipated bypass as required in paragraph (l)(6) of this section (24-hour notice).

(4) *Prohibition of bypass.* (i) Bypass is prohibited, and the Director may take enforcement action against a permittee for bypass, unless:

(A) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(B) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(C) The permittee submitted notices as required under paragraph (m)(3) of this section.

(ii) The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in paragraph (m)(4)(i) of this section.

(n) *Upset*—(1) *Definition.* "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

(2) *Effect of an upset.* An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph (n)(3) of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

(3) *Conditions necessary for a demonstration of upset.* A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(i) An upset occurred and that the permittee can identify the cause(s) of the upset;

(ii) The permitted facility was at the time being properly operated; and

(iii) The permittee submitted notice of the upset as required in paragraph (l)(6)(ii)(B) of this section (24 hour notice).

(iv) The permittee complied with any remedial measures required under paragraph (d) of this section.

(4) *Burden of proof.* In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

(Information collection requirements in paragraph (e)(i) were approved by the Office of Management and Budget under control number 2040-0047)

(Clean Water Act (33 U.S.C. 1251 *et seq.*), Safe Drinking Water Act (42 U.S.C. 300f *et seq.*), Clean Air Act (42 U.S.C. 7401 *et seq.*), Resource Conservation and Recovery Act (42 U.S.C. 6901 *et seq.*))

[48 FR 14153, Apr. 1, 1983, as amended at 48 FR 39620, Sept. 1, 1983; 49 FR 38049, Sept. 26, 1984; 50 FR 4514, Jan. 31, 1985; 50 FR 6940, Feb. 19, 1985; 54 FR 255, Jan. 4, 1989; 54 FR 18783, May 2, 1989]

EDITORIAL NOTE: Information collection requirements in paragraph (l)(1) have not been approved by the Office of Management and Budget, and are not effective, pending OMB approval.

§ 122.42 Additional conditions applicable to specified categories of NPDES permits (applicable to State NPDES programs, see § 123.25).

The following conditions, in addition to those set forth in § 122.41, apply to all NPDES permits within the categories specified below:

(a) *Existing manufacturing, commercial, mining, and silvicultural dischargers.* In addition to the reporting requirements under § 122.41(l), all existing manufacturing, commercial, mining, and silvicultural dischargers must notify the Director as soon as they know or have reason to believe:

(1) That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(i) One hundred micrograms per liter (100 μg/l);

(ii) Two hundred micrograms per liter (200 μg/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 μg/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;

(iii) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with § 122.21(g)(7); or

(iv) The level established by the Director in accordance with § 122.44(f).

(2) That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(i) Five hundred micrograms per liter (500 μg/l);

(ii) One milligram per liter (1 mg/l) for antimony;

(iii) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with § 122.21(g)(7).

(iv) The level established by the Director in accordance with § 122.44(f).

(b) *Publicly owned treatment works.* All POTWs must provide adequate notice to the Director of the following:

(1) Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of CWA if it were directly discharging those pollutants; and

(2) Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

(3) For purposes of this paragraph, adequate notice shall include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

(Information collection requirements in paragraph (a) were approved by the Office of Management and Budget under control number 2040-0045)

[48 FR 14153, Apr. 1, 1983, as amended at 49 FR 38049, Sept. 26, 1984; 50 FR 4514, Jan. 31, 1985]

§ 122.43 Establishing permit conditions (applicable to State programs, see § 123.25).

(a) In addition to conditions required in all permits (§§ 122.41 and 122.42), the Director shall establish conditions, as required on a case-by-case basis, to provide for and assure compliance with all applicable requirements of CWA and regulations. These shall include conditions under §§ 122.46 (duration of permits), 122.47(a) (schedules of compliance), 122.48 (monitoring), and for EPA permits only 122.47(b) (alternates schedule of compliance) and 122.49 (considerations under Federal law).

(b)(1) For a State issued permit, an applicable requirement is a State statutory or regulatory requirement which takes effect prior to final administrative disposition of a permit. For a permit issued by EPA, an applicable requirement is a statutory or regulatory requirement (including any interim final regulation) which takes effect prior to the issuance of the permit (except as provided in § 124.86(c) for NPDES permits being processed under Subpart E or F of Part 124). Section 124.14 (reopening of comment period) provides a means for reopening EPA permit proceedings at the discretion of the Director where new requirements become effective during the permitting process and are of sufficient magnitude to make additonal proceedings desirable. For State and EPA administered programs, an applicable requirement is also any requirement which takes effect prior to the modification or revocation and reissuance of a permit, to the extent allowed in § 122.62.

(2) New or reissued permits, and to the extent allowed under § 122.62 modified or revoked and reissued permits, shall incorporate each of the applicable requirements referenced in §§ 122.44 and 122.45.

(c) *Incorporation.* All permit conditions shall be incorporated either expressly or by reference. If incorporated by reference, a specific citation to the applicable regulations or requirements must be given in the permit.

§ 122.44 Establishing limitations, standards, and other permit conditions (applicable to State NPDES programs, see § 123.25).

In addition to the conditions established under § 122.43(a), each NPDES permit shall include conditions meeting the following requirements when applicable.

(a) *Technology-based effluent limitations and standards* based on effluent limitations and standards promulgated under section 301 of CWA or new source performance standards promulgated under section 306 of CWA, on case-by-case effluent limitations determined under section 402(a)(1) of CWA, or on a combination of the two, in accordance with § 125.3. For new sources or new dischargers, these technology based limitations and standards are subject to the provisions of § 122.29(d) (protection period).

(b)(1) *Other effluent limitations and standards* under sections 301, 302, 303, 307, 318 and 405 of CWA. If any applicable toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under section 307(a) of CWA for a toxic pollutant and that standard or

rohibition is more stringent than any
mitation on the pollutant in the
ermit, the Director shall institute
roceedings under these regulations to
nodify or revoke and reissue the
ermit to conform to the toxic efflu-
nt standard or prohibition. See also
122.41(a).

(2) *Standards for sewage sludge use
r disposal* under section 405(d) of the
WA unless those standards have
een included in a permit issued under
ne appropriate provisions of subtitle
of the Solid Waste Disposal Act,
art C of Safe Drinking Water Act,
ne Marine Protection, Research, and
anctuaries Act of 1972, or the Clean
r Act, or under State permit pro-
ams approved by the Administrator.
hen there are no applicable stand-
ds for sewage sludge use or disposal,
e permit may include requirements
veloped on a case-by-case basis to
otect public health and the environ-
ent from any adverse effects which
ay occur from toxic pollutants in
wage sludge. If any applicable stand-
d for sewage sludge use or disposal is
omulgated under section 405(d) of
e CWA and that standard is more
ringent than any limitation on the
llutant or practice in the permit,
e Director may initiate proceedings
der these regulations to modify or
voke and reissue the permit to con-
m to the standard for sewage
dge use or disposal.

c) *Reopener clause:* for any dis-
arger within a primary industry cat-
ory (see Appendix A), requirements
der section 307(a)(2) of CWA as fol-
vs:

1) On or before June 30, 1981: (i) If
plicable standards or limitations
ve not yet been promulgated, the
rmit shall include a condition stat-
that, if an applicable standard or
itation is promulgated under sec-
ns 301(b)(2) (C) and (D), 304(b)(2),
d 307(a)(2) and that effluent stand-
or limitation is more stringent
n any effluent limitation in the
rmit or controls a pollutant not lim-
d in the permit, the permit shall be
omptly modified or revoked and re-
ued to conform to that effluent
ndard or limitation.

i) If applicable standards or limita-
ns have been promulgated or approved, the permit shall include those standards or limitations. (If EPA approves existing effluent limitations or decides not to develop new effluent limitations, it will publish a notice in the FEDERAL REGISTER that the limitations are "approved" for the purpose of this regulation.)

(2) On or after the statutory deadline set forth in section 301(b)(2) (A), (C), and (E) of CWA, any permit issued shall include effluent limitations to meet the requirements of section 301(b)(2) (A), (C), (D), (E), (F), whether or not applicable effluent limitations guidelines have been promulgated or approved. These permits need not incorporate the clause required by paragraph (c)(1) of this section.

(3) The Director shall promptly modify or revoke and reissue any permit containing the clause required under paragraph (c)(1) of this section to incorporate an applicable effluent standard or limitation under sections 301(b)(2) (C) and (D), 304(b)(2) and 307(a)(2) which is promulgated or approved after the permit is issued if that effluent standard or limitation is more stringent than any effluent limitation in the permit, or controls a pollutant not limited in the permit.

(4) For any permit issued to a treatment works treating domestic sewage (including "sludge-only facilities"), the Director shall include a reopener clause to incorporate any applicable standard for sewage sludge use or disposal promulgated under section 405(d) of the CWA. The Director may promptly modify or revoke and reissue any permit containing the reopener clause required by this paragraph if the standard for sewage sludge use or disposal is more stringent than any requirements for sludge use or disposal in the permit, or controls a pollutant or practice not limited in the permit.

(d) *Water quality standards and State requirements:* any requirements in addition to or more stringent than promulgated effluent limitations guidelines or standards under sections 301, 304, 306, 307, 318 and 405 of CWA necessary to:

(1) Achieve water quality standards established under section 303 of the

CWA, including State narrative criteria for water quality.

(i) Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.

(ii) When determining whether a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative or numeric criteria within a State water quality standard, the permitting authority shall use procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant or pollutant parameter in the effluent, the sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity), and where appropriate, the dilution of the effluent in the receiving water.

(iii) When the permitting authority determines, using the procedures in paragraph (d)(1)(ii) of this section, that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the allowable ambient concentration of a State numeric criteria within a State water quality standard for an individual pollutant, the permit must contain effluent limits for that pollutant.

(iv) When the permitting authority determines, using the procedures in paragraph (d)(1)(ii) of this section, that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the numeric criterion for whole effluent toxicity, the permit must contain effluent limits for whole effluent toxicity.

(v) Except as provided in this subparagraph, when the permitting authority determines, using the procedures in paragraph (d)(1)(ii) of this section, toxicity testing data, or other information, that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excur-
sion above a narrative criterion wit
an applicable State water qua
standard, the permit must contain e
fluent limits for whole effluent tox
ty. Limits on whole effluent toxic
are not necessary where the perm
ting authority demonstrates in t
fact sheet or statement of basis of t
NPDES permit, using the procedur
in paragraph (d)(1)(ii) of this sectio
that chemical-specific limits for the e
fluent are sufficient to attain a
maintain applicable numeric and n
rative State water quality standards

(vi) Where a State has not esta
lished a water quality criterion for
specific chemical pollutant that
present in an effluent at a concentr
tion that causes, has the reasonab
potential to cause, or contributes to
excursion above a narrative criteri
within an applicable State water qu
ity standard, the permitting authori
must establish effluent limits usi
one or more of the following options

(A) Establish effluent limits using
calculated numeric water quality crit
rion for the pollutant which the pe
mitting authority demonstrates w
attain and maintain applicable narr
tive water quality criteria and w
fully protect the designated use. Su
a criterion may be derived using a pr
posed State criterion, or an explic
State policy or regulation interpretin
its narrative water quality criterio
supplemented with other relevant in
formation which may include: EPA
Water Quality Standards Handboo
October 1983, risk assessment data, e
posure data, information about th
pollutant from the Food and Drug Ad
ministration, and current EPA criter
documents; or

(B) Establish effluent limits on
case-by-case basis, using EPA's wate
quality criteria, published under se
tion 307(a) of the CWA, supplemente
where necessary by other relevant in
formation; or

(C) Establish effluent limitations o
an indicator parameter for the pollu
ant of concern, provided:

(*1*) The permit identifies which po
lutants are intended to be controlle
by the use of the effluent limitation;

(*2*) The fact sheet required b
§ 124.56 sets forth the basis for th
limit, including a finding that compl

ance with the effluent limit on the indicator parameter will result in controls on the pollutant of concern which are sufficient to attain and maintain applicable water quality standards;

(*3*) The permit requires all effluent and ambient monitoring necessary to show that during the term of the permit the limit on the indicator parameter continues to attain and maintain applicable water quality standards; and

(*4*) The permit contains a reopener clause allowing the permitting authority to modify or revoke and reissue the permit if the limits on the indicator parameter no longer attain and maintain applicable water quality standards.

(vii) When developing water quality-based effluent limits under this paragraph the permitting authority shall ensure that:

(A) The level of water quality to be achieved by limits on point sources established under this paragraph is derived from, and complies with all applicable water quality standards; and

(B) Effluent limits developed to protect a narrative water quality criterion, a numeric water quality criterion, or both, are consistent with the assumptions and requirements of any available wasteload allocation for the discharge prepared by the State and approved by EPA pursuant to 40 CFR 130.7.

(2) Attain or maintain a specified water quality through water quality related effluent limits established under section 302 of CWA;

(3) Conform to the conditions to a State certification under section 401 of the CWA that meets the requirements of § 124.53 when EPA is the permitting authority. If a State certification is stayed by a court of competent jurisdiction or an appropriate State board or agency, EPA shall notify the State that the Agency will deem certification waived unless a finally effective State certification is received within sixty days from the date of the notice. If the State does not forward a finally effective certification within the sixty day period, EPA shall include conditions in the permit that may be necessary to meet EPA's obligation under section 301(b)(1)(C) of the CWA;

(4) Conform to applicable water quality requirements under section 401(a)(2) of CWA when the discharge affects a State other than the certifying State;

(5) Incorporate any more stringent limitations, treatment standards, or schedule of compliance requirements established under Federal or State law or regulations in accordance with section 301(b)(1)(C) of CWA;

(6) Ensure consistency with the requirements of a Water Quality Management plan approved by EPA under section 208(b) of CWA;

(7) Incorporate section 403(c) criteria under Part 125, Subpart M, for ocean discharges;

(8) Incorporate alternative effluent limitations or standards where warranted by "fundamentally different factors," under 40 CFR Part 125, Subpart D;

(9) Incorporate any other appropriate requirements, conditions, or limitations (other than effluent limitations) into a new source permit to the extent allowed by the National Environmental Policy Act, 42 U.S.C. 4321 *et seq.* and section 511 of the CWA, when EPA is the permit issuing authority. (See § 122.29(c)).

(e) *Technology-based controls for toxic pollutants.* Limitations established under paragraphs (a), (b), or (d) of this section, to control pollutants meeting the criteria listed in paragraph (e)(1) of this section. Limitations will be established in accordance with paragraph (e)(2) of this section. An explanation of the development of these limitations shall be included in the fact sheet under § 124.56(b)(1)(i).

(1) Limitations must control all toxic pollutants which the Director determines (based on information reported in a permit application under § 122.21(g)(7) or (10) or in a notification under § 122.42(a)(1) or on other information) are or may be discharged at a level greater than the level which can be achieved by the technology-based treatment requirements appropriate to the permittee under § 125.3(c); or

(2) The requirement that the limitations control the pollutants meeting

the criteria of paragraph (e)(1) of this section will be satisfied by:

(i) Limitations on those pollutants; or

(ii) Limitations on other pollutants which, in the judgment of the Director, will provide treatment of the pollutants under paragraph (e)(1) of this section to the levels required by § 125.3(c).

(f) *Notification level.* A "notification level" which exceeds the notification level of § 122.42(a)(1)(i), (ii) or (iii), upon a petition from the permittee or on the Director's initiative. This new notification level may not exceed the level which can be achieved by the technology-based treatment requirements appropriate to the permittee under § 125.3(c)

(g) *Twenty-four hour reporting.* Pollutants for which the permittee must report violations of maximum daily discharge limitations under § 122.41(l)(6)(ii)(C) (24-hour reporting) shall be listed in the permit. This list shall include any toxic pollutant or hazardous substance, or any pollutant specifically identified as the method to control a toxic pollutant or hazardous substance.

(h) *Durations* for permits, as set forth in § 122.46.

(i) *Monitoring requirements.* In addition to § 122.48, the following monitoring requirements:

(1) To assure compliance with permit limitations, requirements to monitor:

(i) The mass (or other measurement specificed in the permit) for each pollutant limited in the permit;

(ii) The volume of effluent discharged from each outfall;

(iii) Other measurements as appropriate including pollutants in internal waste streams under § 122.45(i); pollutants in intake water for net limitations under § 122.45(f); frequency, rate of discharge, etc., for noncontinuous discharges under § 122.45(e); pollutants subject to notification requirements under § 122.42(a); and pollutants in sewage sludge or other monitoring as specified in 40 CFR Part 503; or as determined to be necessary on a case-by-case basis pursuant to section 405(d)(4) of the CWA.

(iv) According to test procedures approved under 40 CFR Part 136 for the analyses of pollutants having approved methods under that part, and according to a test procedure specified in the permit for pollutants with no approved methods.

(2) Requirements to report monitoring results with a frequency dependent on the nature and effect of the discharge, but in no case less than once a year. For sewage sludge use or disposal practices, requirements to monitor and report results with a frequency dependent on the nature and effect of the sewage sludge use or disposal practice; minimally, this shall be as specified in 40 CFR Part 503 (where applicable), but in no case less than once a year.

(j) *Pretreatment program for POTWs.* Requirements for POTWs to:

(1) Identify, in terms of character and volume of pollutants, any significant indirect dischargers into the POTW subject to pretreatment standards under section 307(b) of CWA and 40 CFR Part 403.

(2) Submit a local program when required by and in accordance with 40 CFR Part 403 to assure compliance with pretreatment standards to the extent applicable under section 307(b). The local program shall be incorporated into the permit as described in 40 CFR Part 403. The program shall require all indirect dischargers to the POTW to comply with the reporting requirements of 40 CFR Part 403.

(3) For POTWs which are "sludge-only facilities," a requirement to develop a pretreatment program under 40 CFR Part 403 when the Director determines that a pretreatment program is necessary to assure compliance with Section 405(d) of the CWA.

(k) *Best management practices* to control or abate the discharge of pollutants when:

(1) Authorized under section 304(e) of CWA for the control of toxic pollutants and hazardous substances from ancillary industrial activities;

(2) Numeric effluent limitations are infeasible, or

(3) The practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of CWA.

(l) *Reissued permits.* (1) Except as provided in paragraph (l)(2) of this section when a permit is renewed or reissued, interim effluent limitations, standards or conditions must be at least as stringent as the final effluent limitations, standards, or conditions in the previous permit (unless the circumstances on which the previous permit was based have materially and substantially changed since the time the permit was issued and would constitute cause for permit modification or revocation and reissuance under § 122.62.)

(2) In the case of effluent limitations established on the basis of Section 402(a)(1)(B) of the CWA, a permit may not be renewed, reissued, or modified on the basis of effluent guidelines promulgated under section 304(b) subsequent to the original issuance of such permit, to contain effluent limitations which are less stringent than the comparable effluent limitations in the previous permit.

(i) Exceptions—A permit with respect to which paragraph (l)(2) of this section applies may be renewed, reissued, or modified to contain a less stringent effluent limitation applicaole to a pollutant, if—

(A) Material and substantial alterations or additions to the permitted acility occurred after permit issuance vhich justify the application of a less tringent effluent limitation;

(B)(*1*) Information is available vhich was not availabie at the time of ermit issuance (other than revised egulations, guidance, or test methods) nd which would have justified the aplication of a less stringent effluent imitation at the time of permit issunce; or

(*2*) The Administrator determines hat technical mistakes or mistaken nterpretations of law were made in isuing the permit under section 02(a)(1)(b);

(C) A less stringent effluent limitaion is necessary because of events ver which the permittee has no conrol and for which there is no reasonbly available remedy;

(D) The permittee has received a ermit modification under section 01(c), 301(g), 301(h), 301(i), 301(k), 01(n), or 316(a); or

(E) The permittee has installed the treatment facilities required to meet the effluent limitations in the previous permit and has properly operated and maintained the facilities but has nevertheless been unable to achieve the previous effluent limitations, in which case the limitations in the reviewed, reissued, or modified permit may reflect the level of pollutant control actually achieved (but shall not be less stringent than required by effluent guidelines in effect at the time of permit renewal, reissuance, or modification).

(ii) *Limitations.* In no event may a permit with respect to which paragraph (l)(2) of this section applies be renewed, reissued, or modified to contain an effluent limitation which is less stringent than required by effluent guidelines in effect at the time the permit is renewed, reissued, or modified. In no event may such a permit to discharge into waters be renewed, issued, or modified to contain a less stringent effluent limitation if the implementation of such limitation would result in a violation of a water quality standard under section 303 applicable to such waters.

(m) *Privately owned treatment works.* For a privately owned treatment works, any conditions expressly applicable to any user, as a limited copermittee, that may be necessary in the permit issued to the treatment works to ensure compliance with applicable requirements under this part. Alternatively, the Director may issue separate permits to the treatment works and to its users, or may require a separate permit application from any user. The Director's decision to issue a permit with no conditions applicable to any user, to impose conditions on one or more users, to issue separate permits, or to require separate applications, and the basis for that decision, shall be stated in the fact sheet for the draft permit for the treatment works.

(n) *Grants.* Any conditions imposed in grants made by the Administrator to POTWs under sections 201 and 204 of CWA which are reasonably necessary for the achievement of effluent limitations under section 301 of CWA.

(o) *Sewage sludge.* Requirements under section 405 of CWA governing the disposal of sewage sludge from publicly owned treatment works or any other treatment works treating domestic sewage for any use for which regulations have been established, in accordance with any applicable regulations.

(p) *Coast Guard.* When a permit is issued to a facility that may operate at certain times as a means of transportation over water, a condition that the discharge shall comply with any applicable regulations promulgated by the Secretary of the department in which the Coast Guard is operating, that establish specifications for safe transportation, handling, carriage, and storage of pollutants.

(q) *Navigation.* Any conditions that the Secretary of the Army considers necessary to ensure that navigation and anchorage will not be substantially impaired, in accordance with § 124.58.

[48 FR 14153, Apr. 1, 1983, as amended at 49 FR 31842, Aug. 8, 1984; 49 FR 38049, Sept. 26, 1984; 50 FR 6940, Feb. 19, 1985; 50 FR 7912, Feb. 27, 1985; 54 FR 256, Jan. 4, 1989; 54 FR 18783, May 2, 1989; 54 FR 23895, June 2, 1989]

§ 122.45 Calculating NPDES permit conditions (applicable to State NPDES programs, see § 123.25).

(a) *Outfalls and discharge points.* All permit effluent limitations, standards and prohibitions shall be established for each outfall or discharge point of the permitted facility, except as otherwise provided under § 122.44(k) (BMPs where limitations are infeasible) and paragraph (i) of this section (limitations on internal waste streams).

(b) *Production-based limitations.* (1) In the case of POTWs, permit effluent limitations, standards, or prohibitions shall be calculated based on design flow.

(2)(i) Except in the case of POTWs or as provided in paragraph (b)(2)(ii) of this section, calculation of any permit limitations, standards, or prohibitions which are based on production (or other measure of operation) shall be based not upon the designed production capacity but rather upon a reasonable measure of actual production of the facility. For new sources or new dischargers, actual production shall be estimated using projected production. The time period of the measure of production shall correspond to the time period of the calculated permit limitations; for example, monthly production shall be used to calculate average monthly discharge limitations.

(ii)(A)(*1*) The Director may include a condition establishing alternate permit limitations, standards, or prohibitions based upon anticipated increased (not to exceed maximum production capability) or decreased production levels.

(*2*) *For the automotive manufacturing industry* only, the Regional Administrator shall, and the State Director may establish a condition under paragraph (b)(2)(ii)(A)(*1*) of this section if the applicant satisfactorily demonstrates to the Director at the time the application is submitted that its actual production, as indicated in paragraph (b)(2)(i) of this section, is substantially below maximum production capability and that there is a reasonable potential for an increase above actual production during the duration of the permit.

(B) If the Director establishes permit conditions under paragraph (b)(2)(ii)(A) of this section:

(*1*) The permit shall require the permittee to notify the Director at least two business days prior to a month in which the permittee expects to operate at a level higher than the lowest production level identified in the permit. The notice shall specify the anticipated level and the period during which the permittee expects to operate at the alternate level. If the notice covers more than one month, the notice shall specify the reasons for the anticipated production level increase. New notice of discharge at alternate levels is required to cover a period or production level not covered by prior notice or, if during two consecutive months otherwise covered by a notice, the production level at the permitted facility does not in fact meet the higher level designated in the notice.

(*2*) The permittee shall comply with the limitations, standards, or prohibitions that correspond to the lowest level of production specified in the permit, unless the permittee has notified the Director under paragraph (b)(2)(ii)(B)(*1*) of this section, in which case the permittee shall comply with the lower of the actual level of production during each month or the level specified in the notice.

(*3*) The permittee shall submit with the DMR the level of production that actually occurred during each month and the limitations, standards, or prohibitions applicable to that level of production..

(c) *Metals.* All permit effluent limitations, standards, or prohibitions for a metal shall be expressed in terms of "total recoverable metal" as defined in 40 CFR Part 136 unless:

(1) An applicable effluent standard or limitation has been promulgated under the CWA and specifies the limitation for the metal in the dissolved or valent or total form; or

(2) In establishing permit limitations on a case-by-case basis under § 125.3, it is necessary to express the limitation on the metal in the dissolved or valent or total form to carry out the provisions of the CWA; or

(3) All approved analytical methods for the metal inherently measure only its dissolved form (*e.g.,* hexavalent chromium).

(d) *Continuous discharges.* For continuous discharges all permit effluent limitations, standards, and prohibitions, including those necessary to achieve water quality standards, shall unless impracticable be stated as:

(1) Maximum daily and average monthly discharge limitations for all dischargers other than publicly owned treatment works; and

(2) Average weekly and average monthly discharge limitations for POTWs.

(e) *Non-continuous discharges.* Discharges which are not continuous, as defined in § 122.2, shall be particularly described and limited, considering the following factors, as appropriate:

(1) Frequency (for example, a batch discharge shall not occur more than once every 3 weeks);

(2) Total mass (for example, not to exceed 100 kilograms of zinc and 200 kilograms of chromium per batch discharge);

(3) Maximum rate of discharge of pollutants during the discharge (for example, not to exceed 2 kilograms of zinc per minute); and

(4) Prohibition or limitation of specified pollutants by mass, concentration, or other appropriate measure (for example, shall not contain at any time more than 0.1 mg/1 zinc or more than 250 grams (¼ kilogram) of zinc in any discharge).

(f) *Mass limitations.* (1) All pollutants limited in permits shall have limitations, standards or prohibitions expressed in terms of mass except:

(i) For pH, temperature, radiation, or other pollutants which cannot appropriately be expressed by mass;

(ii) When applicable standards and limitations are expressed in terms of other units of measurement; or

(iii) If in establishing permit limitations on a case-by-case basis under § 125.3, limitations expressed in terms of mass are infeasible because the mass of the pollutant discharged cannot be related to a measure of operation (for example, discharges of TSS from certain mining operations), and permit conditions ensure that dilution will not be used as a substitute for treatment.

(2) Pollutants limited in terms of mass additionally may be limited in terms of other units of measurement, and the permit shall require the permittee to comply with both limitations.

(g) *Pollutants in intake water.* (1) Upon request of the discharger, technology-based effluent limitations or standards shall be adjusted to reflect credit for pollutants in the discharger's intake water if:

(i) The applicable effluent limitations and standards contained in 40 CFR Subchapter N specifically provide that they shall be applied on a net basis; or

(ii) The discharger demonstrates that the control system it proposes or uses to meet applicable technology-based limitations and standards would, if properly installed and operated, meet the limitations and standards in the absence of pollutants in the intake waters.

(2) Credit for generic pollutants such as biochemical oxygen demand

(BOD) or total suspended solids (TSS) should not be granted unless the permittee demonstrates that the constituents of the generic measure in the effluent are substantially similar to the constituents of the generic measure in the intake water or unless appropriate additional limits are placed on process water pollutants either at the outfall or elsewhere.

(3) Credit shall be granted only to the extent necessary to meet the applicable limitation or standard, up to a maximum value equal to the influent value. Additional monitoring may be necessary to determine eligibility for credits and compliance with permit limits.

(4) Credit shall be granted only if the discharger demonstrates that the intake water is drawn from the same body of water into which the discharge is made. The Director may waive this requirement if he finds that no environmental degradation will result.

(5) This section does not apply to the discharge of raw water clarifier sludge generated from the treatment of intake water.

(h) *Internal waste streams.* (1) When permit effluent limitations or standards imposed at the point of discharge are impractical or infeasible, effluent limitations or standards for discharges of pollutants may be imposed on internal waste streams before mixing with other waste streams or cooling water streams. In those instances, the monitoring required by § 122.44(i) shall also be applied to the internal waste streams.

(2) Limits on internal waste streams will be imposed only when the fact sheet under § 124.56 sets forth the exceptional circumstances which make such limitations necessary, such as when the final discharge point is inaccessible (for example, under 10 meters of water), the wastes at the point of discharge are so diluted as to make monitoring impracticable, or the interferences among pollutants at the point of discharge would make detection or analysis impracticable.

(i) *Disposal of pollutants into wells, into POTWs or by land application.* Permit limitations and standards shall be calculated as provided in § 122.50.

(Information collection requirements in paragraph (b) were approved by the Office of Management and Budget under control number 2040-0077)

[48 FR 14153, Apr. 1, 1983, as amended at 49 FR 38049, Sept. 26, 1984; 50 FR 4514, Jan. 31, 1985; 54 FR 258, Jan. 4, 1989; 54 FR 18784, May 2, 1989]

§ 122.46 Duration of permits (applicable to State programs, see § 123.25).

(a) NPDES permits shall be effective for a fixed term not to exceed 5 years.

(b) Except as provided in § 122.6, the term of a permit shall not be extended by modification beyond the maximum duration specified in this section.

(c) The Director may issue any permit for a duration that is less than the full allowable term under this section.

(d) A permit may be issued to expire on or after the statutory deadline set forth in section 301(b)(2) (A), (C), and (E) (July 1, 1984), if the permit includes effluent limitations to meet the requirements of section 301(b)(2) (A), (C), (D), (E) and (F), whether or not applicable effluent limitations guidelines have been promulgated or approved.

(e) A determination that a particular discharger falls within a given industrial category for purposes of setting a permit expiration date under paragraph (d) of this section is not conclusive as to the discharger's inclusion in that industrial category for any other purposes, and does not prejudice any rights to challenge or change that inclusion at the time that a permit based on that determination is formulated.

[48 FR 14153, Apr. 1, 1983, as amended at 49 FR 31842, Aug. 8, 1984; 50 FR 6940, Feb. 19, 1985]

§ 122.47 Schedules of compliance.

(a) *General (applicable to State programs, see § 123.25).* The permit may, when appropriate, specify a schedule of compliance leading to compliance with CWA and regulations.

(1) *Time for compliance.* Any schedules of compliance under this section shall require compliance as soon as possible, but not later than the applicable statutory deadline under the CWA.

(2) The first NPDES permit issued to a new source or a new discharger shall contain a schedule of compliance only when necessary to allow a reasonable opportunity to attain compliance with requirements issued or revised after commencement of construction but less than three years before commencement of the relevant discharge. For recommencing dischargers, a schedule of compliance shall be available only when necessary to allow a reasonable opportunity to attain compliance with requirements issued or revised less than three years before recommencement of discharge.

(3) *Interim dates.* Except as provided in paragraph (b)(1)(ii) of this section, if a permit establishes a schedule of compliance which exceeds 1 year from the date of permit issuance, the schedule shall set forth interim requirements and the dates for their achievement.

(i) The time between interim dates shall not exceed 1 year, except that in the case of a schedule for compliance with standards for sewage sludge use and disposal, the time between interim dates shall not exceed six months.

(ii) If the time necessary for comple- ion of any interim requirement (such s the construction of a control facili- y) is more than 1 year and is not eadily divisible into stages for com- letion, the permit shall specify inter- m dates for the submission of reports f progress toward completion of the nterim requirements and indicate a rojected completion date.

NOTE: Examples of interim requirements nclude: (a) Submit a complete Step 1 con- ruction grant (for POTWs); (b) let a con- act for construction of required facilities;) commence construction of required fa- ilities; (d) complete construction of re- uired facilities.

(4) *Reporting.* The permit shall be ritten to require that no later than days following each interim date d the final date of compliance, the rmittee shall notify the Director in iting of its compliance or noncom- iance with the interim or final re- irements, or submit progress reports paragraph (a)(3)(ii) is applicable.

b) *Alternative schedules of compli- ce.* An NPDES permit applicant or rmittee may cease conducting regulated activities (by terminating of direct discharge for NPDES sources) rather than continuing to operate and meet permit requriements as follows:

(1) If the permittee decides to cease conducting regulated activities at a given time within the term of a permit which has already been issued:

(i) The permit may be modified to contain a new or additional schedule leading to timely cessation of activities; or

(ii) The permittee shall cease conducting permitted activities before non-compliance with any interim or final compliance schedule requirement already specified in the permit.

(2) If the decision to cease conducting regulated activities is made before issuance of a permit whose term will include the termination date, the permit shall contain a schedule leading to termination which will ensure timely compliance with applicable requirements no later than the statutory deadline.

(3) If the permittee is undecided whether to cease conducting regulated activities, the Director may issue or modify a permit to contain two schedules as follows:

(i) Both schedules shall contain an identical interim deadline requiring a final decision on whether to cease conducting regulated activities no later than a date which ensures sufficient time to comply with applicable requirements in a timely manner if the decision is to continue conducting regulated activities;

(ii) One schedule shall lead to timely compliance with applicable requirements, no later than the statutory deadline;

(iii) The second schedule shall lead to cessation of regulated activities by a date which will ensure timely compliance with applicable requirements no later than the statutory deadline.

(iv) Each permit containing two schedules shall include a requirement that after the permittee has made a final decision under paragraph (b)(3)(i) of this section it shall follow the schedule leading to compliance if the decision is to continue conducting regulated activities, and follow the schedule leading to termination if the decision is to cease conducting regulated activities.

(4) The applicant's or permittee's decision to cease conducting regulated activities shall be evidenced by a firm public commitment satisfactory to the Director, such as a resolution of the board of directors of a corporation.

[48 FR 14153, Apr. 1, 1983, as amended at 49 FR 38050, Sept. 26, 1984; 50 FR 6940, Feb. 19, 1985; 54 FR 18784, May 2, 1989]

§ 122.48 Requirements for recording and reporting of monitoring results (applicable to State programs, see § 123.25).

All permits shall specify:

(a) Requirements concerning the proper use, maintenance, and installation, when appropriate, of monitoring equipment or methods (including biological monitoring methods when appropriate);

(b) Required monitoring including type, intervals, and frequency sufficient to yield data which are representative of the monitored activity including, when appropriate, continuous monitoring;

(c) Applicable reporting requirements based upon the impact of the regulated activity and as specified in § 122.44. Reporting shall be no less frequent than specified in the above regulation.

[48 FR 14153, Apr. 1, 1983; 50 FR 6940, Feb. 19, 1985]

§ 122.49 Considerations under Federal law.

The following is a list of Federal laws that may apply to the issuance of permits under these rules. When any of these laws is applicable, its procedures must be followed. When the applicable law requires consideration or adoption of particular permit conditions or requires the denial of a permit, those requirements also must be followed.

(a) The *Wild and Scenic Rivers Act*, 16 U.S.C. 1273 *et seq.* section 7 of the Act prohibits the Regional Administrator from assisting by license or otherwise the construction of any water resources project that would have a direct, adverse effect on the values for which a national wild and scenic river was established.

(b) The *National Historic Pre*
tion Act of 1966, 16 U.S.C. 470 e
section 106 of the Act and imple
ing regulations (36 CFR Part 80
quire the Regional Administ
before issuing a license, to adopt
ures when feasible to mitigate p
tial adverse effects of the license
tivity and properties listed or el
for listing in the National Regist
Historic Places. The Act's req
ments are to be implemented in
eration with State Historic Pres
tion Officers and upon notice to,
when appropriate, in consult
with the Advisory Council on His
Preservation.

(c) The *Endangered Species Ac*
U.S.C. 1531 *et seq.* section 7 of the
and implementing regulations
CFR Part 402) require the Reg
Administrator to ensure, in cons
tion with the Secretary of the Int
or Commerce, that any action au
ized by EPA is not likely to jeopa
the continued existence of any en
gered or threatened species or adv
ly affect its critical habitat.

(d) The *Coastal Zone Manage*
Act, 16 U.S.C. 1451 *et seq.* se
307(c) of the Act and implemen
regulations (15 CFR Part 930) pro
EPA from issuing a permit fcr a
tivity affecting land or water us
the coastal zone until the appli
certifies that the proposed act
complies with the State Coastal
Management program, and the S
or its designated agency concurs
the certification (or the Secretar
Commerce overrides the State's
concurrence).

(e) The *Fish and Wildlife Coord*
tion Act, 16 U.S.C. 661 *et seq.*, requ
that the Regional Administra
before issuing a permit proposing
authorizing the impoundment (
certain exemptions), diversion,
other control or modification of
body of water, consult with the ap
priate State agency exercising juris
tion over wildlife resources to cons
those resources.

(f) *Executive orders.* [Reserved]

(g) The National Environmen
Policy Act, 42 U.S.C. 4321 *et seq.*, m
require preparation of an Environm
tal Impact Statement and consid
ation of EIS-related permit conditi

(other than effluent limitations) as provided in § 122.29(c).

(Clean Water Act (33 U.S.C. 1251 *et seq.*), Safe Drinking Water Act (42 U.S.C. 300f *et seq.*), Clean Air Act (42 U.S.C. 7401 *et seq.*), Resource Conservation and Recovery Act (42 U.S.C. 6901 *et seq.*))

[48 FR 14153, Apr. 1, 1983, as amended at 48 FR 39620, Sept. 1, 1983; 49 FR 38050, Sept. 26, 1984]

§ 122.50 Disposal of pollutants into wells, into publicly owned treatment works or by land application (applicable to State NPDES programs, see § 123.25).

(a) When part of a discharger's process wastewater is not being discharged into waters of the United States or contiguous zone because it is disposed into a well, into a POTW, or by land application thereby reducing the flow or level of pollutants being discharged into waters of the United States, applicable effluent standards and limitations for the discharge in an NPDES permit shall be adjusted to reflect the reduced raw waste resulting from such disposal. Effluent limitations and standards in the permit shall be calculated by one of the following methods:

(1) If none of the waste from a particular process is discharged into waters of the United States, and effluent limitations guidelines provide separate allocation for wastes from that process, all allocations for the process shall be eliminated from calculation of permit effluent limitations or standards.

(2) In all cases other than those described in paragraph (a)(1) of this section, effluent limitations shall be adjusted by multiplying the effluent limitation derived by applying effluent limitation guidelines to the total waste stream by the amount of wastewater flow to be treated and discharged into waters of the United States, and dividing the result by the total wastewater flow. Effluent limitations and standards so calculated may be further adjusted under Part 125, Subpart D to make them more or less stringent if discharges to wells, publicly owned treatment works, or by land application change the character or treatability of the pollutants being discharged to receiving waters. This method may be algebraically expressed as:

$$P = \frac{E \times N}{T}$$

where P is the permit effluent limitation, E is the limitation derived by applying effluent guidelines to the total wastestream, N is the wastewater flow to be treated and discharged to waters of the United States, and T is the total wastewater flow.

(b) Paragraph (a) of this section does not apply to the extent that promulgated effluent limitations guidelines:

(1) Control concentrations of pollutants discharged but not mass; or

(2) Specify a different specific technique for adjusting effluent limitations to account for well injection, land application, or disposal into POTWs.

(c) Paragraph (a) of this section does not alter a discharger's obligation to meet any more stringent requirements established under §§ 122.41, 122.42, 122.43, and 122.44.

[48 FR 14153, Apr. 1, 1983, as amended at 49 FR 38050, Sept. 26, 1984]

Subpart D—Transfer, Modification, Revocation and Reissuance, and Termination of Permits

§ 122.61 Transfer of permits (applicable to State programs, see § 123.25).

(a) *Transfers by modification.* Except as provided in paragraph (b) of this section, a permit may be transferred by the permittee to a new owner or operator only if the permit has been modified or revoked and reissued (under § 122.62(b)(2)), or a minor modification made (under § 122.63(d)), to identify the new permittee and incorporate such other requirements as may be necessary under CWA.

(b) *Automatic transfers.* As an alternative to transfers under paragraph (a) of this section, any NPDES permit may be automatically transferred to a new permittee if:

(1) The current permittee notifies the Director at least 30 days in advance of the proposed transfer date in paragraph (b)(2) of this section;

(2) The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage, and liability between them; and

(3) The Director does not notify the existing permittee and the proposed new permittee of his or her intent to modify or revoke and reissue the permit. A modification under ths subparagraph may also be a minor modification under § 122.63. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in paragraph (b)(2) of this section.

§ 122.62 Modification or revocation and reissuance of permits (applicable to State programs, see § 123.25).

When the Director receives any information (for example, inspects the facility, receives information submitted by the permittee as required in the permit (see § 122.41), receives a request for modification or revocation and reissuance under § 124.5, or conducts a review of the permit file) he or she may determine whether or not one or more of the causes listed in paragraphs (a) and (b) of this section for modification or revocation and reissuance or both exist. If cause exists, the Director may modify or revoke and reissue the permit accordingly, subject to the limitations of § 124.5(c), and may request an updated application if necessary. When a permit is modified, only the conditions subject to modification are reopened. If a permit is revoked and reissued, the entire permit is reopened and subject to revision and the permit is reissued for a new term. See § 124.5(c)(2). If cause does not exist under this section or § 122.63, the Director shall not modify or revoke and reissue the permit. If a permit modification satisfies the criteria in § 122.63 for "minor modifications" the permit may be modified without a draft permit or public review. Otherwise, a draft permit must be prepared and other procedures in Part 124 (or procedures of an approved State program) followed.

(a) *Causes for modification.* The following are causes for modification but not revocation and reissuance of p
mits except when the permittee
quests or agrees.

(1) *Alterations.* There are mate
and substantial alterations or ad
tions to the permitted facility or act
ity (including a change or changes
the permittee's sludge use or dispo
practice) which occurred after perm
issuance which justify the applicati
of permit conditions that are differe
or absent in the existing permit.

NOTE: Certain reconstruction activit
may cause the new source provisions
§ 122.29 to be applicable.

(2) *Information.* The Director h
received new information. Permi
may be modified during their term
for this cause only if the informatio
was not available at the time of perm
issuance (other than revised regul
tions, guidance, or test methods) an
would have justified the application
different permit conditions at the tim
of issuance. For NPDES general pe
mits (§ 122.28) this cause includes an
information indicating that cumula
tive effects on the environment ar
unacceptable. For new source or ne
discharger NPDES permits §§ 122.2
122.29), this cause shall include an
significant information derived from
effluent testing required unde
§ 122.21(k)(5)(vi) or § 122.21(h)(4)(iii
after issuance of the permit.

(3) *New regulations.* The standards or regulations on which the permit was based have been changed by promulgation of amended standards or regulations or by judicial decision after the permit was issued. Permits may be modified during their terms for this cause only as follows:

(i) For promulgation of amended standards or regulations, when:

(A) The permit condition requested to be modified was based on a promulgated effluent limitation guideline, EPA approved or promulgated water quality standards, or the Secondary Treatment Regulations under Part 133; and

(B) EPA has revised, withdrawn, or modified that portion of the regulation or effluent limitation guideline on which the permit condition was based, or has approved a State action with regard to a water quality standard on which the permit condition was based; and

(C) A permittee requests modification in accordance with § 124.5 within ninety (90) days after FEDERAL REGISTER notice of the action on which the request is based.

(ii) For judicial decisions, a court of competent jurisdiction has remanded and stayed EPA promulgated regulations or effluent limitation guidelines, if the remand and stay concern that portion of the regulations or guidelines on which the permit condition was based and a request is filed by the permittee in accordance with § 124.5 within ninety (90) days of judicial remand.

(iii) For changes based upon modified State certifications of NPDES permits, see § 124.55(b).

(4) *Compliance schedules.* The Director determines good cause exists for modification of a compliance schedule, such as an act of God, strike, flood, or materials shortage or other events over which the permittee has little or no control and for which there is no reasonably available remedy. However, in no case may an NPDES compliance schedule be modified to extend beyond an applicable CWA statutory deadline. See also § 122.63(c) (minor modifications) and paragraph (a)(14) of this section (NPDES innovative technology).

(5) When the permittee has filed a request for a variance under CWA section 301(c), 301(g), 301(h), 301(i), 301(k), or 316(a) or for "fundamentally different factors" within the time specified in § 122.21 or § 125.27(a).

(6) *307(a) toxics.* When required to incorporate an applicable 307(a) toxic effluent standard or prohibition (see § 122.44(b)).

(7) *Reopener.* When required by the "reopener" conditions in a permit, which are established in the permit under § 122.44(b) (for CWA toxic effluent limitations and standards for sewage sludge use or disposal, see also § 122.44(c)) or 40 CFR § 403.10(e) (pretreatment program).

(8)(i) *Net limits.* Upon request of a permittee who qualifies for effluent limitations on a net basis under § 122.45(h).

(ii) When a discharger is no longer eligible for net limitations, as provided in § 122.45(h)(1)(ii)(B).

(9) *Pretreatment.* As necessary under 40 CFR 403.8(e) (compliance schedule for development of pretreatment program).

(10) *Failure to notify.* Upon failure of an approved State to notify, as required by section 402(b)(3), another State whose waters may be affected by a discharge from the approved State.

(11) *Non-limited pollutants.* When the level of discharge of any pollutant which is not limited in the permit exceeds the level which can be achieved by the technology-based treatment requirements appropriate to the permittee under § 125.3(c).

(12) *Notification levels.* To establish a "notification level" as provided in § 122.44(f).

(13) *Compliance schedules.* To modify a schedule of compliance to reflect the time lost during construction of an innovative or alternative facility, in the case of a POTW which has received a grant under section 202(a)(3) of CWA for 100% of the costs to modify or replace facilities constructed with a grant for innovative and alternative wastewater technology under section 202(a)(2). In no case shall the compliance schedule be modified to extend beyond an applicable CWA statutory deadline for compliance.

(14) When the permit becomes final and effective on or after August 19, 1981, if the permittee shows good cause for the modification, to conform to changes respecting the following regulations issued under the Settlement Agreement dated November 16, 1981, in connection with *Natural Resources Defense Council* v. *EPA*, No. 80–1607 and consolidated cases: § 122.41(c) and (d).

(15) To correct technical mistakes, such as errors in calculation, or mistaken interpretations of law made in determining permit conditions.

(16) When the discharger has installed the treatment technology considered by the permit writer in setting effluent limitations imposed under section 402(a)(1) of the CWA and has properly operated and maintained the facilities but nevertheless has been

unable to achieve those effluent limitations. In this case, the limitations in the modified permit may reflect the level of pollutant control actually achieved (but shall not be less stringent than required by a subsequently promulgated effluent limitations guideline).

(17) When the permit becomes final and effective on or after March 9, 1982, and the permittee applies for the modification no later than January 24, 1985, if the permittee shows good cause in its request and that it qualifies for the modification, to conform to changes respecting the following regulations issued under that Settlement Agreement:

40 CFR 122.45(b)
40 CFR 122.45(c)
40 CFR 122.50

(18) *Land application plans.* When required by a permit condition to incorporate a land application plan for beneficial reuse of sewage sludge, to revise an existing land application plan, or to add a land application plan.

(b) *Causes for modification or revocation and reissuance.* The following are causes to modify or, alternatively, revoke and reissue a permit:

(1) Cause exists for termination under § 122.64, and the Director determines that modification or revocation and reissuance is appropriate.

(2) The Director has received notification (as required in the permit, see § 122.41(l)(3)) of a proposed transfer of the permit. A permit also may be modified to reflect a transfer after the effective date of an automatic transfer (§ 122.61(b)) but will not be revoked and reissued after the effective date of the transfer except upon the request of the new permittee.

(Information collection requirements in paragraph (a) were approved by the Office of Management and Budget under control number 2040-0068)

(Clean Water Act (33 U.S.C. 1251 *et seq.*), Safe Drinking Water Act (42 U.S.C. 300f *et seq.*), Clean Air Act (42 U.S.C. 7401 *et seq.*), Resource Conservation and Recovery Act (42 U.S.C. 6901 *et seq.*))

[48 FR 14153, Apr. 1, 1983, as amended at 49 FR 25981, June 25, 1984; 49 FR 37009, Sept. 29, 1984; 49 FR 38050, Sept. 26, 1984; 50 FR 4514, Jan. 31, 1985; 51 FR 20431, June 4, 1986; 51 FR 26993, July 28, 1986; 54 FR 256, 258, Jan. 4, 1989; 54 FR 18784, May 2, 1989]

§ 122.63 Minor modifications of permits.

Upon the consent of the permittee, the Director may modify a permit to make the corrections or allowances for changes in the permitted activity listed in this section, without following the procedures of Part 124. Any permit modification not processed as minor modification under this section must be made for cause and with Part 124 draft permit and public notice as required in § 122.62. Minor modifications may only:

(a) Correct typographical errors;

(b) Require more frequent monitoring or reporting by the permittee;

(c) Change an interim compliance date in a schedule of compliance, provided the new date is not more than 120 days after the date specified in the existing permit and does not interfere with attainment of the final compliance date requirement; or

(d) Allow for a change in ownership or operational control of a facility where the Director determines that no other change in the permit is necessary, provided that a written agreement containing a specific date for transfer of permit responsibility, coverage, and liability between the current and new permittees has been submitted to the Director.

(e)(1) Change the construction schedule for a discharger which is new source. No such change shall affect a discharger's obligation to have all pollution control equipment installed and in operation prior to discharge under § 122.29.

(2) Delete a point source outfall when the discharge from that outfall is terminated and does not result in discharge of pollutants from other outfalls except in accordance with permit limits.

(f) When the permit becomes final and effective on or after March 1982, conform to changes respecting §§ 122.41(e), 122.41(122.41(m)(4)(i)(B), 122.41(n)(3)(i) and 122.42(a) issued September 26, 1984.

(g) Incorporate conditions of POTW pretreatment program that has been approved in accordance with the procedures in 40 CFR 403.11 (or modification thereto that has been approved in accordance with the procedures in 40 CFR 403.18) as enforceable conditions of the POTW's permits.

[48 FR 14153, Apr. 1, 1983, as amended at 49 FR 38051, Sept. 26, 1984; 51 FR 20431, June 4, 1986; 53 FR 40616, Oct. 17, 1988]

§ 122.64 Termination of permits (applicable to State programs, see § 123.25).

(a) The following are causes for terminating a permit during its term, or for denying a permit renewal application:

(1) Noncompliance by the permittee with any condition of the permit;

(2) The permittee's failure in the application or during the permit issuance process to disclose fully all relevant facts, or the permittee's misrepresentation of any relevant facts at any time;

(3) A determination that the permitted activity endangers human health or the environment and can only be regulated to acceptable levels by permit modification or termination; or

(4) A change in any condition that requires either a temporary or permanent reduction or elimination of any discharge or sludge use or disposal practice controlled by the permit (for example, plant closure or termination of discharge by connection to a POTW).

(b) The Director shall follow the applicable procedures in Part 124 or State procedures in terminating any NPDES permit under this section.

[48 FR 14153, Apr. 1, 1983; 50 FR 6940, Feb. 19, 1985, as amended at 54 FR 18784, May 2, 1989]

APPENDIX A—NPDES PRIMARY INDUSTRY CATEGORIES

Any permit issued after June 30, 1981 to lischargers in the following categories shall nclude effluent limitations and a complince schedule to meet the requirements of ection 301(b)(2)(A), (C), (D), (E) and (F) of WA, whether or not applicable effluent mitations guidelines have been promulgatd. See §§ 122.44 and 122.46.

Industry Category

dhesives and sealants
luminum forming
uto and other laundries
Battery manufacturing
Coal mining
Coil coating
Copper forming
Electrical and electronic components
Electroplating
Explosives manufacturing
Foundries
Gum and wood chemicals
Inorganic chemicals manufacturing
Iron and steel manufacturing
Leather tanning and finishing
Mechanical products manufacturing
Nonferrous metals manufacturing
Ore mining
Organic chemicals manufacturing
Paint and ink formulation
Pesticides
Petroleum refining
Pharmaceutical preparations
Photographic equipment and supplies
Plastics processing
Plastic and synthetic materials manufacturing
Porcelain enameling
Printing and publishing
Pulp and paper mills
Rubber processing
Soap and detergent manufacturing
Steam electric power plants
Textile mills
Timber products processing

APPENDIX B—CRITERIA FOR DETERMINING A CONCENTRATED ANIMAL FEEDING OPERATION (§ 122.23)

An animal feeding operation is a concentrated animal feeding operation for purposes of § 122.23 if either of the following criteria are met.

(a) More than the numbers of animals specified in any of the following categories are confined:

(1) 1,000 slaughter and feeder cattle,

(2) 700 mature dairy cattle (whether milked or dry cows),

(3) 2,500 swine each weighing over 25 kilograms (approximately 55 pounds),

(4) 500 horses,

(5) 10,000 sheep or lambs,

(6) 55,000 turkeys,

(7) 100,000 laying hens or broilers (if the facility has continuous overflow watering),

(8) 30,000 laying hens or broilers (if the facility has a liquid manure system),

(9) 5,000 ducks, or

(10) 1,000 animal units; or

(b) More than the following number and types of animals are confined:

(1) 300 slaughter or feeder cattle,

(2) 200 mature dairy cattle (whether milked or dry cows),

(3) 750 swine each weighing over 25 kilograms (approximately 55 pounds),

(4) 150 horses,

(5) 3,000 sheep or lambs,

(6) 16,500 turkeys,

(7) 30,000 laying hens or broilers (if the facility has continuous overflow watering),

(8) 9,000 laying hens or broilers (if the facility has a liquid manure handling system),

(9) 1,500 ducks, or

(10) 300 animal units;

and either one of the following conditions are met: pollutants are discharged into navigable waters through a manmade ditch, flushing system or other similar man-made device; or pollutants are discharged directly into waters of the United States which originate outside of and pass over, across, or through the facility or otherwise come into direct contact with the animals confined in the operation.

Provided, however, that no animal feeding operation is a concentrated animal feeding operation as defined above if such animal feeding operation discharges only in the event of a 25 year, 24-hour storm event.

The term "animal unit" means a unit of measurement for any animal feeding operation calculated by adding the following numbers: the number of slaughter and feeder cattle multiplied by 1.0, plus the number of mature dairy cattle multiplied by 1.4, plus the number of swine weighing over 25 kilograms (approximately 55 pounds) multiplied by 0.4, plus the number of sheep multiplied by 0.1, plus the number of horses multiplied by 2.0.

The term "manmade" means constructed by man and used for the purpose of transporting wastes.

APPENDIX C—CRITERIA FOR DETERMINING A CONCENTRATED AQUATIC ANIMAL PRODUCTION FACILITY (§ 122.24)

A hatchery, fish farm, or other facility is a concentrated aquatic animal production facility for purposes of § 122.24 if it contains, grows, or holds aquatic animals in either of the following categories:

(a) Cold water fish species or other cold water aquatic animals in ponds, raceways, or other similar structures which discharge at least 30 days per year but does not include:

(1) Facilities which produce less than 9,090 harvest weight kilograms (approximately 20,000 pounds) of aquatic animals per year; and

(2) Facilities which feed less than 2,272 kilograms (approximately 5,000 pounds) of food during the calendar month of maximum feeding.

(b) Warm water fish species or other warm water aquatic animals in ponds, raceways, or other similar structures which discharge at least 30 days per year, but does not include:

(1) Closed ponds which discharge only during periods of excess runoff; or

(2) Facilities which produce less than 45,454 harvest weight kilograms (approximately 100,000 pounds) of aquatic animals per year.

"Cold water aquatic animals" include, but are not limited to, the *Salmonidae* family of fish; e.g., trout and salmon.

"Warm water aquatic animals" include, but are not limited to, the *Ameiuride*, *Centrarchidae* and *Cyprinidae* families of fish; e.g., respectively, catfish, sunfish and minnows.

APPENDIX D—NPDES PERMIT APPLICATION TESTING REQUIREMENTS (§ 122.21)

TABLE I—TESTING REQUIREMENTS FOR ORGANIC TOXIC POLLUTANTS BY INDUSTRIAL CATEGORY FOR EXISTING DISCHARGERS

Industrial category	GC/MS Fraction [1]			
	Volatile	Acid	Base/neutral	Pesticide
Adhesives and Sealants	[2]	[2]	[2]	
Aluminum Forming	[2]	[2]	[2]	
Auto and Other Laundries	[2]	[2]	[2]	[2]
Battery Manufacturing	[2]		[2]	
Coal Mining	[2]	[2]	[2]	[2]
Coil Coating	[2]	[2]	[2]	
Copper Forming	[2]	[2]	[2]	
Electric and Electronic Components	[2]	[2]	[2]	[2]
Electroplating	[2]	[2]	[2]	
Explosives Manufacturing		[2]	[2]	
Foundries	[2]	[2]	[2]	
Gum and Wood Chemicals	[2]	[2]	[2]	[2]
Inorganic Chemicals Manufacturing	[2]	[2]	[2]	
Iron and Steel Manufacturing	[2]	[2]	[2]	
Leather Tanning and Finishing	[2]	[2]	[2]	[2]
Mechanical Products Manufacturing	[2]	[2]	[2]	
Nonferrous Metals Manufacturing	[2]	[2]	[2]	[2]
Ore Mining	[2]	[2]	[2]	[2]
Organic Chemicals Manufacturing	[2]	[2]	[2]	[2]
Paint and Ink Formulation	[2]	[2]	[2]	[2]
Pesticides	[2]	[2]	[2]	[2]
Petroleum Refining	[2]	[2]	[2]	[2]
Pharmaceutical Preparations	[2]	[2]	[2]	
Photographic Equipment and Supplies	[2]	[2]	[2]	[2]

Industrial category	GC/MS Fraction [1]			
	Volatile	Acid	Base/neutral	Pesticide
lastic and Synthetic Materials Manufacturing	[2]	[2]	[2]	[2]
lastic Processing	[2]			
orcelain Enameling	[2]		[2]	[2]
rinting and Publishing	[2]	[2]	[2]	[2]
ulp and Paper Mills	[2]	[2]	[2]	[2]
ubber Processing	[2]	[2]	[2]	
oap and Detergent Manufacturing	[2]	[2]	[2]	
team Electric Power Plants	[2]	[2]	[2]	
xtile Mills	[2]	[2]	[2]	[2]
mber Products Processing	[2]	[2]	[2]	[2]

[1] The toxic pollutants in each fraction are listed in Table II.

[2] Testing required.

ABLE II—ORGANIC TOXIC POLLUTANTS IN EACH OF FOUR FRACTIONS IN ANALYSIS BY GAS CHROMATOGRAPHY/MASS SPECTROSCOPY (GS/MS)

Volatiles

acrolein
acrylonitrile
benzene
bromoform
carbon tetrachloride
chlorobenzene
chlorodibromomethane
chloroethane
2-chloroethylvinyl ether
chloroform
dichlorobromomethane
1,1-dichloroethane
1,2-dichloroethane
1,1-dichloroethylene
1,2-dichloropropane
1,3-dichloropropylene
ethylbenzene
methyl bromide
methyl chloride
methylene chloride
1,1,2,2-tetrachloroethane
tetrachloroethylene
toluene
1,2-trans-dichloroethylene
1,1,1-trichloroethane
1,1,2-trichloroethane
trichloroethylene
vinyl chloride

Acid Compounds

2-chlorophenol
2,4-dichlorophenol
2,4-dimethylphenol
,6-dinitro-o-cresol
2,4-dinitrophenol
-nitrophenol
-nitrophenol

8A p-chloro-m-cresol
9A pentachlorophenol
10A phenol
11A 2,4,6-trichlorophenol

Base/Neutral

1B acenaphthene
2B acenaphthylene
3B anthracene
4B benzidine
5B benzo(a)anthracene
6B benzo(a)pyrene
7B 3,4-benzofluoranthene
8B benzo(ghi)perylene
9B benzo(k)fluoranthene
10B bis(2-chloroethoxy)methane
11B bis(2-chloroethyl)ether
12B bis(2-chloroisopropyl)ether
13B bis (2-ethylhexyl)phthalate
14B 4-bromophenyl phenyl ether
15B butylbenzyl phthalate
16B 2-chloronaphthalene
17B 4-chlorophenyl phenyl ether
18B chrysene
19B dibenzo(a,h)anthracene
20B 1,2-dichlorobenzene
21B 1,3-dichlorobenzene
22B 1,4-dichlorobenzene
23B 3,3′-dichlorobenzidine
24B diethyl phthalate
25B dimethyl phthalate
26B di-n-butyl phthalate
27B 2,4-dinitrotoluene
28B 2,6-dinitrotoluene
29B di-n-octyl phthalate
30B 1,2-diphenylhydrazine (as azobenzene)
31B fluroranthene
32B fluorene
33B hexachlorobenzene
34B hexachlorobutadiene
35B hexachlorocyclopentadiene
36B hexachloroethane
37B indeno(1,2,3-cd)pyrene
38B isophorone
39B napthalene
40B nitrobenzene
41B N-nitrosodimethylamine
42B N-nitrosodi-n-propylamine
43B N-nitrosodiphenylamine
44B phenanthrene
45B pyrene
46B 1,2,4-trichlorobenzene

Pesticides

1P aldrin
2P alpha-BHC
3P beta-BHC
4P gamma-BHC
5P delta-BHC
6P chlordane
7P 4,4′-DDT
8P 4,4′-DDE
9P 4,4′-DDD
10P dieldrin
11P alpha-endosulfan

12P beta-endosulfan
13P endosulfan sulfate
14P endrin
15P endrin aldehyde
16P heptachlor
17P heptachlor epoxide
18P PCB-1242
19P PCB-1254
20P PCB-1221
21P PCB-1232
22P PCB-1248
23P PCB-1260
24P PCB-1016
25P toxaphene

TABLE III—OTHER TOXIC POLLUTANTS (METALS AND CYANIDE) AND TOTAL PHENOLS

Antimony, Total
Arsenic, Total
Beryllium, Total
Cadmium, Total
Chromium, Total
Copper, Total
Lead, Total
Mercury, Total
Nickel, Total
Selenium, Total
Silver, Total
Thallium, Total
Zinc, Total
Cyanide, Total
Phenols, Total

TABLE IV—CONVENTIONAL AND NONCONVENTIONAL POLLUTANTS REQUIRED TO BE TESTED BY EXISTING DISCHARGERS IF EXPECTED TO BE PRESENT

Bromide
Chlorine, Total Residual
Color
Fecal Coliform
Fluoride
Nitrate-Nitrite
Nitrogen, Total Organic
Oil and Grease
Phosphorus, Total
Radioactivity
Sulfate
Sulfide
Sulfite
Surfactants
Aluminum, Total
Barium, Total
Boron, Total
Cobalt, Total
Iron, Total
Magnesium, Total
Molybdenum, Total
Manganese, Total
Tin, Total
Titanium, Total

TABLE V—TOXIC POLLUTANTS AND H ARDOUS SUBSTANCES REQUIRED BE IDENTIFIED BY EXISTING D CHARGERS IF EXPECTED TO PRESENT

Toxic Pollutants

Asbestos

Hazardous Substances

Acetaldehyde
Allyl alcohol
Allyl chloride
Amyl acetate
Aniline
Benzonitrile
Benzyl chloride
Butyl acetate
Butylamine
Captan
Carbaryl
Carbofuran
Carbon disulfide
Chlorpyrifos
Coumaphos
Cresol
Crotonaldehyde
Cyclohexane
2,4-D (2,4-Dichlorophenoxy acetic acid)
Diazinon
Dicamba
Dichlobenil
Dichlone
2,2-Dichloropropionic acid
Dichlorvos
Diethyl amine
Dimethyl amine
Dintrobenzene
Diquat
Disulfoton
Diuron
Epichlorohydrin
Ethion
Ethylene diamine
Ethylene dibromide
Formaldehyde
Furfural
Guthion
Isoprene
Isopropanolamine Dodecylbenzenesulfo
Kelthane
Kepone
Malathion
Mercaptodimethur
Methoxychlor
Methyl mercaptan
Methyl methacrylate
Methyl parathion
Mevinphos
Mexacarbate
Monoethyl amine
Monomethyl amine
Naled
Napthenic acid
Nitrotoluene

Parathion
Phenolsulfanate
Phosgene
Propargite
Propylene oxide
Pyrethrins
Quinoline
Resorcinol
Strontium
Strychnine
Styrene
2,4,5-T (2,4,5-Trichlorophenoxy acetic acid)
TDE (Tetrachlorodiphenylethane)
2,4,5-TP [2-(2,4,5-Trichlorophenoxy) propanoic acid]
Trichlorofan
Triethanolamine dodecylbenzenesulfonate
Triethylamine
Trimethylamine
Uranium
Vanadium
Vinyl acetate
Xylene
Xylenol
Zirconium

[Note 1: The Environmental Protection Agency has suspended the requirements of § 122.21(g)(7)(ii)(A) and Table I of Appendix D as they apply to certain industrial categories. The suspensions are as follows:

a. At 46 FR 2046, Jan. 8, 1981, the Environmental Protection Agency suspended until further notice § 122.21(g)(7)(ii)(A) as it applies to coal mines.

b. At 46 FR 22585, Apr. 20, 1981, the Environmental Protection Agency suspended until further notice § 122.21(g)(7)(ii)(A) and the corresponding portions of Item V-C of the NPDES application Form 2c as they apply to:

1. Testing and reporting for all four organic fractions in the Greige Mills Subcategory of the Textile Mills industry (Subpart C—Low water use processing of 40 CFR Part 410), and testing and reporting for the pesticide fraction in all other subcategories of this industrial category.

2. Testing and reporting for the volatile, base/neutral and pesticide fractions in the Base and Precious Metals Subcategory of the Ore Mining and Dressing industry (Subpart B of 40 CFR Part 440), and testing and reporting for all four fractions in all other subcategories of this industrial category.

3. Testing and reporting for all four GC/MS fractions in the Porcelain Enameling industry.

c. At 46 FR 35090, July 1, 1981, the Envionmental Protection Agency suspended ntil further notice § 122.21(g)(7)(ii)(A) and he corresponding portions of Item V-C of he NPDES application Form 2c as they pply to:

1. Testing and reporting for the pesticide raction in the Tall Oil Rosin Subcategory Subpart D) and Rosin-Based Derivatives ubcategory (Subpart F) of the Gum and Wood Chemicals industry (40 CFR Part 454), and testing and reporting for the pesticide and base/netural fractions in all other subcategories of this industrial category.

2. Testing and reporting for the pesticide fraction in the Leather Tanning and Finishing, Paint and Ink Formulation, and Photographic Supplies industrial categories.

3. Testing and reporting for the acid, base/neutral and pesticide fractions in the Petroleum Refining industrial category.

4. Testing and reporting for the pesticide fraction in the Papergrade Sulfite subcategories (Subparts J and U) of the Pulp and Paper industry (40 CFR Part 430); testing and reporting for the base/neutral and pesticide fractions in the following subcategories: Deink (Subpart Q), Dissolving Kraft (Subpart F), and Paperboard from Waste Paper (Subpart E); testing and reporting for the volatile, base/neutral and pesticide fractions in the following subcategories: BCT Bleached Kraft (Subpart H), Semi-Chemical (Subparts B and C), and Nonintegrated-Fine Papers (Subpart R); and testing and reporting for the acid, base/neutral, and pesticide fractions in the following subcategories: Fine Bleached Kraft (Subpart I), Dissolving Sulfite Pulp (Subpart K), Groundwood-Fine Papers (Subpart O), Market Bleached Kraft (Subpart G), Tissue from Wastepaper (Subpart T), and Nonintegrated-Tissue Papers (Subpart S).

5. Testing and reporting for the base/neutral fraction in the Once-Through Cooling Water, Fly Ash and Bottom Ash Transport Water process wastestreams of the Steam Electric Power Plant industrial category.

This revision continues these suspensions.]*

For the duration of the suspensions, therefore, Table I effectively reads:

TABLE I—TESTING REQUIREMENTS FOR ORGANIC TOXIC POLLUTANTS BY INDUSTRY CATEGORY

Industry category	GC/MS fraction [2]			
	Volatile	Acid	Neutral	Pesticide
Adhesives and sealants	(1)	(1)	(1)	
Aluminum forming	(1)	(1)	(1)	
Auto and other laundries	(1)	(1)	(1)	(1)
Battery manufacturing	(1)		(1)	
Coal mining				
Coil coating	(1)	(1)	(1)	
Copper forming	(1)	(1)	(1)	
Electric and electronic compounds	(1)	(1)	(1)	(1)
Electroplating	(1)	(1)	(1)	
Explosives manufacturing		(1)	(1)	

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* Editorial Note: The words "This revision" refer to the document published at 48 FR 14153, Apr. 1, 1983.

TABLE I—TESTING REQUIREMENTS FOR ORGANIC TOXIC POLLUTANTS BY INDUSTRY CATEGORY—Continued

Industry category	GC/MS fraction [2]			
	Volatile	Acid	Neutral	Pesticide
Foundries	(1)	(1)	(1)	
Gum and wood (all subparts except D and F)	(1)	(1)		
Subpart D—tall oil rosin	(1)	(1)	(1)	
Subpart F—rosin-based derivatives	(1)	(1)	(1)	
Inorganic chemicals manufacturing	(1)	(1)	(1)	
Iron and steel manufacturing	(1)	(1)	(1)	
Leather tanning and finishing	(1)	(1)	(1)	
Mechanical products manufacturing	(1)	(1)	(1)	
Nonferrous metals manufacturing	(1)	(1)	(1)	(1)
Ore mining (applies to the base and precious metals/Subpart B)		(1)		
Organic chemicals manufacturing	(1)	(1)	(1)	(1)
Paint and ink formulation	(1)	(1)	(1)	
Pesticides	(1)	(1)	(1)	(1)
Petroleum refining	(1)			
Pharmaceutical preparations	(1)	(1)	(1)	
Photographic equipment and supplies	(1)	(1)	(1)	
Plastic and synthetic materials manufacturing	(1)	(1)	(1)	(1)
Plastic processing	(1)			
Porcelain enameling				
Printing and publishing	(1)	(1)	(1)	(1)
Pulp and paperboard mills—see footnote [3]				
Rubber processing	(1)	(1)	(1)	
Soap and detergent manufacturing	(1)	(1)	(1)	
Steam electric power plants	(1)	(1)		
Textile mills (Subpart C—Greige Mills are exempt from this table)	(1)	(1)	(1)	
Timber products processing	(1)	(1)	(1)	(1)

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[1] Testing required.

[2] The pollutants in each fraction are listed in Item V-C.

[3] Pulp and Paperboard Mills:

Subpart [3]	GS/MS fractions			
	VOA	Acid	Base/neutral	Pesticides
A	[2]	(1)	[2]	(1)
B	[2]	(1)	[2]	[2]
C	[2]	(1)	[2]	[2]
D	[2]	(1)	[2]	[2]
E	(1)	(1)	[2]	(1)
F	(1)	(1)	[2]	[2]
G	(1)	(1)	[2]	
H	(1)	(1)	[2]	
I	(1)	(1)	[2]	
J	(1)	(1)	(1)	
K	(1)	(1)	[2]	
L	(1)	(1)	[2]	
M	(1)	(1)	[2]	
N	(1)	(1)	[2]	
O	(1)	(1)	[2]	
P	(1)	(1)	[2]	
Q	(1)	(1)	[2]	
R	[2]	(1)	[2]	
S	(1)	(1)	[2]	
T	(1)	(1)	[2]	
U	(1)	(1)	(1)	

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[1] Must test.

[2] Do not test unless "reason to believe" it is discha

[3] Subparts are defined in 40 CFR Part 430.

[48 FR 14153, Apr. 1, 1983, as amended a FR 38050, Sept. 26, 1984; 50 FR 6940, F 19, 1985]

PART 123—STATE PROGRAM REQUIREMENTS

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AUTHORITY: Clean Water Act, 33 U.S.C. 1251 *et seq.*

SOURCE: 48 FR 14178, Apr. 1, 1983, unless otherwise noted.

Subpart A—General

§ 123.1 Purpose and scope.

(a) This part specifies the procedures EPA will follow in approving, revising, and withdrawing State programs and the requirements State programs must meet to be approved by the Administrator under sections 318, 402, and 405 (National Pollutant Discharge Elimination System—NPDES) of CWA.

(b) These regulations are promulgated under the authority of sections 304(i), 101(e), and 405 of CWA, and implement the requirements of those sections.

(c) The Administrator shall approve State programs which conform to the applicable requirements of this part. A State NPDES program will not be approved by the Administrator under section 402 of CWA unless it has authority to control the discharges specified in sections 318 and 405(a) of CWA. Permit programs under sections 318 and 405(a) will not be approved independent of a section 402 program. (Permit programs under section 405(f) of CWA (sludge management programs) may be approved under 40 CFR Part 501 independently of a section 402 permit program.)

(d) Upon approval of a State program, the Administrator shall suspend he issuance of Federal permits for hose activities subject to the approved State program. After program pproval EPA shall retain jurisdiction ver any permits (including general ermits) which it has issued unless arangements have been made with the State in the Memorandum of Agreement for the State to assume responsibility for these permits. Retention of jurisdiction shall include the processing of any permit appeals, modification requests, or variance requests; the conduct of inspections, and the receipt and review of self-monitoring reports. If any permit appeal, modification request or variance request is not finally resolved when the federally issued permit expires, EPA may, with the consent of the State, retain jurisdiction until the matter is resolved.

(e) Upon submission of a complete program, EPA will conduct a public hearing, if interest is shown, and determine whether to approve or disapprove the program taking into consideration the requirements of this part, the CWA and any comments received.

(f) Any State program approved by the Administrator shall at all times be conducted in accordance with the requirements of this part.

(g)(1) Except as may be authorized pursuant to paragraph (g)(2) of this section or excluded by § 122.3, the State program must prohibit all point source discharges of pollutants, all discharges into aquaculture projects, and all disposal of sewage sludge which results in any pollutant from such sludge entering into any waters of the United States within the State's jurisdiction except as authorized by a permit in effect under the State program or under section 402 of CWA. NPDES authority may be shared by two or more State agencies but each agency must have Statewide jurisdiction over a class of activities or discharges. When more than one agency is responsible for issuing permits, each agency must make a submission meeting the requirements of § 123.21 before EPA will begin formal review.

(2) A State may seek approval of a partial or phased program in accordance with section 402(n) of the CWA.

(h) A State's lack of authority to regulate activities on Indian lands does not impair a State's ability to obtain full program approval in accordance with this part, i.e., inability of a State to regulate activities on Indian lands does not constitute a partial program. EPA will administer the program on Indian lands if the State does not seek this authority.

NOTE: States are advised to contact the United States Department of the Interior, Bureau of Indian Affairs, concerning authority over Indian lands.

(i) Nothing in this part precludes a State from:

(1) Adopting or enforcing requirements which are more stringent or more extensive than those required under this part;

(2) Operating a program with a greater scope of coverage than that required under this part. If an approved State program has greater scope of coverage than required by Federal law the additional coverage is not part of the Federally approved program.

NOTE: For example, if a State requires permits for discharges into publicly owned treatment works, these permits are not NPDES permits.

[48 FR 14178, Apr. 1, 1983, as amended at 54 FR 256, Jan. 4, 1989; 54 FR 18784, May 2, 1989]

§ 123.2 Definitions.

The definitions in Part 122 and Part 501 apply to all subparts of this Part.

[54 FR 18784, May 2, 1989]

§ 123.3 Coordination with other programs.

Issuance of State permits under this part may be coordinated with issuance of RCRA, UIC, NPDES, and 404 permits whether they are controlled by the State, EPA, or the Corps of Engineers. See § 124.4.

Subpart B—State Program Submissions

§ 123.21 Elements of a program submission.

(a) Any State that seeks to administer a program under this part shall submit to the Administrator at least three copies of a program submission. The submission shall contain the following:

(1) A letter from the Governor of the State requesting program approval;

(2) A complete program description, as required by § 123.22, describing how
the State intends to carry out its
sponsibilities under this part;

(3) An Attorney General's statem
as required by § 123.23;

(4) A Memorandum of Agreem
with the Regional Administrator as
quired by § 123.24;

(5) Copies of all applicable St
statutes and regulations, includ
those governing State administrat
procedures;

(b) Within 30 days of receipt by E
of a State program submission, E
will notify the State whether its s
mission is complete. If EPA finds th
a State's submission is complete, t
statutory review period (i.e., t
period of time allotted for formal E
review of a proposed State progr
under CWA) shall be deemed to ha
begun on the date of receipt of t
State's submission. If EPA finds that
State's submission is incomplete, t
statutory review period shall not beg
until all the necessary information
received by EPA.

(c) If the State's submission is mat
rially changed during the statuto
review period, the statutory revie
period shall begin again upon recei
of the revised submission.

(d) The State and EPA may exte
the statutory review period by agre
ment.

[48 FR 14178, Apr. 1, 1983; 50 FR 6941, Fe
19, 1985]

§ 123.22 Program description.

Any State that seeks to administer
program under this part shall subm
a description of the program it pr
poses to administer in lieu of the Fe
eral program under State law or unde
an interstate compact. The progra
description shall include:

(a) A description in narrative for
of the scope, structure, coverage an
processes of the State program.

(b) A description (including orga
zation charts) of the organization an
structure of the State agency or age
cies which will have responsibility fo
administering the program, includin
the information listed below. If mor
than one agency is responsible for a
ministration of a program, eac
agency must have statewide jurisdi
tion over a class of activities. The r

sponsibilities of each agency must be delineated, their procedures for coordination set forth, and an agency may be designated as a "lead agency" to facilitate communications between EPA and the State agencies having program responsibility. If the State proposes to administer a program of greater scope of coverage than is required by Federal law, the information provided under this paragraph shall indicate the resources dedicated to administering the Federally required portion of the program.

(1) A description of the State agency staff who will carry out the State program, including the number, occupations, and general duties of the employees. The State need not submit complete job descriptions for every employee carrying out the State program.

(2) An itemization of the estimated costs of establishing and administering the program for the first two years after approval, including cost of the personnel listed in paragraph (b)(1) of this section, cost of administrative support, and cost of technical support.

(3) An itemization of the sources and amounts of funding, including an estimate of Federal grant money, available to the State Director for the first two years after approval to meet the costs listed in paragraph (b)(2) of this section, identifying any restrictions or limitations upon this funding.

(c) A description of applicable State procedures, including permitting procedures and any State administrative or judicial review procedures;

(d) Copies of the permit form(s), application form(s), and reporting form(s) the State intends to employ in its program. Forms used by States need not be identical to the forms used by EPA but should require the same basic information, except that State NPDES programs are required to use standard Discharge Monitoring Reports (DMR). The State need not provide copies of uniform national forms it intends to use but should note its intention to use such forms.

NOTE: States are encouraged to use uniform national forms established by the Administrator. If uniform national forms are used, they may be modified to include the State Agency's name, address, logo, and other similar information, as appropriate, in place of EPA's.

(e) A complete description of the State's compliance tracking and enforcement program.

(f) A State seeking approval of a sludge management program under section 405(f) of the CWA as part of its NPDES program, in addition to the above requirements of this section, shall include the inventory as required in 40 CFR 501.12(f).

[48 FR 14178, Apr. 1, 1983; 50 FR 6941, Feb. 19, 1985, as amended at 54 FR 18784, May 2, 1989]

§ 123.23 Attorney General's statement.

(a) Any State that seeks to administer a program under this part shall submit a statement from the State Attorney General (or the attorney for those State or interstate agencies which have independent legal counsel) that the laws of the State, or an interstate compact, provide adequate authority to carry out the program described under § 123.22 and to meet the requirements of this part. This statement shall include citations to the specific statutes, administrative regulations, and, where appropriate, judicial decisions which demonstrate adequate authority. State statutes and regulations cited by the State Attorney General or independent legal counsel shall be in the form of lawfully adopted State statutes and regulations at the time the statement is signed and shall be fully effective by the time the program is approved. To qualify as "independent legal counsel" the attorney signing the statement required by this section must have full authority to independently represent the State agency in court on all matters pertaining to the State program.

NOTE: EPA will supply States with an Attorney General's statement format on request.

(b) If a State seeks authority over activities on Indian lands, the statement shall contain an appropriate analysis of the State's authority.

(c) The Attorney General's statement shall certify that the State has adequate legal authority to issue and enforce general permits if the State seeks to implement the general permit program under § 122.28.

§ 123.24 Memorandum of Agreement with the Regional Administrator.

(a) Any State that seeks to administer a program under this part shall submit a Memorandum of Agreement. The Memorandum of Agreement shall be executed by the State Director and the Regional Administrator and shall become effective when approved by the Administrator. In addition to meeting the requirements of paragraph (b) of this section, the Memorandum of Agreement may include other terms, conditions, or agreements consistent with this part and relevant to the administration and enforcement of the State's regulatory program. The Administrator shall not approve any Memorandum of Agreement which contains provisions which restrict EPA's statutory oversight responsibility.

(b) The Memorandum of Agreement shall include the following:

(1) Provisions for the prompt transfer from EPA to the State of pending permit applications and any other information relevant to program operation not already in the possession of the State Director (e.g., support files for permit issuance, compliance reports, etc.). If existing permits are transferred from EPA to the State for administration, the Memorandum of Agreement shall contain provisions specifying a procedure for transferring the administration of these permits. If a State lacks the authority to directly administer permits issued by the Federal government, a procedure may be established to transfer responsibility for these permits.

NOTE: For example, EPA and the State and the permittee could agree that the State would issue a permit(s) identical to the outstanding Federal permit which would simultaneously be terminated.

(2) Provisions specifying classes and categories of permit applications, draft permits, and proposed permits that the State will send to the Regional Administrator for review, comment and, where applicable, objection.

(3) Provisions specifying the frequency and content of reports, documents and other information which the State is required to submit to EPA. The State shall allow EPA to routinely review State records, reports, and files relevant to the administration and enforcement of the approved program. State reports may be combined with grant reports where appropriate. These procedures shall implement the requirements of § 123.43.

(4) Provisions on the State's compliance monitoring and enforcement program, including:

(i) Provisions for coordination of compliance monitoring activities by the State and by EPA. These may specify the basis on which the Regional Administrator will select facilities or activities within the State for EPA inspection. The Regional Administrator will normally notify the State at least 7 days before any such inspection; and

(ii) Procedures to assure coordination of enforcement activities.

(5) When appropriate, provisions for joint processing of permits by the State and EPA for facilities or activities which require permits from both EPA and the State under different programs. (See § 124.4.)

NOTE: To promote efficiency and to avoid duplication and inconsistency, States are encouraged to enter into joint processing agreements with EPA for permit issuance. Likewise, States are encouraged (but not required) to consider steps to coordinate or consolidate their own permit programs and activities.

(6) Provisions for modification of the Memorandum of Agreement in accordance with this part.

(c) The Memorandum of Agreement, the annual program grant and the State/EPA Agreement should be consistent. If the State/EPA Agreement indicates that a change is needed in the Memorandum of Agreement, the Memorandum of Agreement may be amended through the procedures set forth in this part. The State/EPA Agreement may not override the Memorandum of Agreement.

NOTE: Detailed program priorities and specific arrangements for EPA support of the State program will change and are therefore more appropriately negotiated in the context of annual agreements rather than in the MOA. However, it may still be appropriate to specify in the MOA the basis for such detailed agreements, e.g., a provision in the

MOA specifying that EPA will select facilities in the State for inspection annually as part of the State/EPA agreement.

(d) The Memorandum of Agreement
shall also specify the extent to which
EPA will waive its right to review,
bject to, or comment upon State-
ssued permits under section 402(d)(3),
e) or (f) of CWA. While the Regional
Administrator and the State may
gree to waive EPA review of certain
classes or categories" of permits, no
aiver of review may be granted for
he following classes or categories:

(1) Discharges into the territorial
ea;

(2) Discharges which may affect the
aters of a State other than the one
n which the discharge originates;

(3) Discharges proposed to be regu-
ted by general permits (see § 122.28);

(4) Discharges from publicly owned
eatment works with a daily average
scharge exceeding 1 million gallons
er day;

(5) Discharges of uncontaminated
oling water with a daily average dis-
arge exceeding 500 million gallons
er day;

(6) Discharges from any major dis-
arger or from any discharger within
y of the 21 industrial categories
ted in Appendix A to Part 122;

(7) Discharges from other sources
th a daily average discharge exceed-
g 0.5 (one-half) million gallons per
y, except that EPA review of per-
ts for discharges of non-process
stewater may be waived regardless
flow.

8) "Class I sludge management fa-
ities" as defined in 40 CFR 501.2.

e) Whenever a waiver is granted
der paragraph (d) of this section,
e Memorandum of Agreement shall
ntain:

1) A statement that the Regional
ministrator retains the right to ter-
nate the waiver as to future permit
ions, in whole or in part, at any
e by sending the State Director
itten notice of termination; and

2) A statement that the State shall
ply EPA with copies of final per-
s.

FR 14178, Apr. 1, 1983; 50 FR 6941, Feb.
1985, as amended at 54 FR 18784, May 2,
9]

§ 123.25 **Requirements for permitting.**

(a) All State Programs under this Part must have legal authority to implement each of the following provisions and must be administered in conformance with each, except that a State which chooses not to administer a sludge management program pursuant to section 405(f) of the CWA as part of its NPDES program is not required to have legal authority to implement the portions of the following provisions which were promulgated after the enactment of the Water Quality Act of 1987 (Pub. L. 100-4) and which govern sewage sludge use and disposal. In all cases, States are not precluded from omitting or modifying any provisions to impose more stringent requirements:

(1) § 122.4—(Prohibitions);

(2) § 122.5(a) and (b)—(Effect of permit);

(3) § 122.7(b) and (c)—(Confidential information);

(4) § 122.21(a)-(b), (e)-(j), and (l)-(o)—(Application for a permit);

(5) § 122.22—(Signatories);

(6) § 122.23—(Concentrated animal feeding operations);

(7) § 122.24—(Concentrated aquatic animal production facilities);

(8) § 122.25—(Aquaculture projects);

(9) § 122.26—(Separate storm sewers);

(10) § 122.27—(Silviculture);

(11) § 122.28—(General permits), *Provided* that States which do not seek to implement the general permit program under § 122.28 need not do so.

(12) § 122.41—(Applicable permit conditions);

(13) § 122.42—(Conditions applicable to specified categories of permits);

(14) § 122.43—(Establishing permit conditions);

(15) § 122.44—(Establishing NPDES permit conditions);

(16) § 122.45—(Calculating permit conditions);

(17) § 122.46—(Duration);

(18) § 122.47(a)—(Schedules of compliance);

(19) § 122.48—(Monitoring requirements);

(20) § 122.50—(Disposal into wells);

(21) § 122.61—(Permit transfer);

(22) § 122.62—(Permit modification);

(23) § 122.64—(Permit termination);

(24) § 124.3(a)—(Application for a permit);

(25) § 124.5 (a), (c), (d), and (f)—(Modification of permits);

(26) § 124.6 (a), (c), (d), and (e)—(Draft permit);

(27) § 124.8—(Fact sheets);

(28) § 124.10 (a)(1)(ii), (a)(1)(iii), (a)(1)(v), (b), (c), (d), and (e)—(Public notice);

(29) § 124.11—(Public comments and requests for hearings);

(30) § 124.12(a)—(Public hearings); and

(31) § 124.17 (a) and (c)—(Response to comments);

(32) § 124.56—(Fact sheets);

(33) § 124.57(a)—(Public notice);

(34) § 124.59—(Comments from government agencies);

(35) § 124.62—(Decision on variances);

(36) Subparts A, B, C, D, H, I, J, K and L of Part 125; and

(37) 40 CFR Parts 129, 133, Subchapter N and 40 CFR Part 503.

NOTE: States need not implement provisions identical to the above listed provisions. Implemented provisions must, however, establish requirements at least as stringent as the corresponding listed provisions. While States may impose more stringent requirements, they may not make one requirement more lenient as a tradeoff for making another requirement more stringent; for example, by requiring that public hearings be held prior to issuing any permit while reducing the amount of advance notice of such a hearing.

State programs may, if they have adequate legal authority, implement any of the provisions of Parts 122 and 124. See, for example, § 122.5(d) (continuation of permits) and § 124.4 (consolidation of permit processing).

For example, a State may impose more stringent requirements in an NPDES program by omitting the upset provision of § 122.41 or by requiring more prompt notice of an upset.

(b) State NPDES programs shall have an approved continuing planning process under 40 CFR 35.1500 and shall assure that the approved planning process is at all times consistent with CWA.

(c) State NPDES programs shall ensure that any board or body which approves all or portions of permits shall not include as a member any person who receives, or has during
previous 2 years received, a signific
portion of income directly or indire
ly from permit holders or applica
for a permit.

(1) For the purposes of this pa
graph:

(i) "Board or body" includes any
dividual, including the Director, w
has or shares authority to approve
or portions of permits either in t
first instance, as modified or reissue
or on appeal.

(ii) "Significant portion of incom
means 10 percent or more of gross p
sonal income for a calendar ye
except that it means 50 percent
more of gross personal income for
calendar year if the recipient is ov
60 years of age and is receiving th
portion under retirement, pension,
similar arrangement.

(iii) "Permit holders or applica
for a permit" does not include any d
partment or agency of a State gover
ment, such as a Department of Pa
or a Department of Fish and Wildli

(iv) "Income" includes retireme
benefits, consultant fees, and sto
dividends.

(2) For the purposes of paragra
(c) of this section, income is not
ceived "directly or indirectly fr
permit holders or applicants for
permit" when it is derived fr
mutual fund payments, or from oth
diversified investments for which t
recipient does not know the identity
the primary sources of income.

[48 FR 14178, Apr. 1, 1983; 50 FR 6941, F
19, 1985; 50 FR 7912, Feb. 27, 1985,
amended at 54 FR 18784, May 2, 1989]

§ 123.26 Requirements for complia evaluation programs.

(a) State programs shall have pro
dures for receipt, evaluation, retenti
and investigation for possible enfor
ment of all notices and reports
quired of permittees and other re
lated persons (and for investigati
for possible enforcement of failure
submit these notices and reports).

(b) State programs shall have insp
tion and surveillance procedures to d
termine, independent of informati
supplied by regulated persons, comp
ance or noncompliance with applica

program requirements. The State shall maintain:

(1) A program which is capable of making comprehensive surveys of all facilities and activities subject to the State Director's authority to identify persons subject to regulation who have failed to comply with permit application or other program requirements. Any compilation, index or inventory of such facilities and activities shall be made available to the Regional Administrator upon request;

(2) A program for periodic inspections of the facilities and activities subject to regulation. These inspections shall be conducted in a manner designed to:

(i) Determine compliance or noncompliance with issued permit conditions and other program requirements;

(ii) Verify the accuracy of information submitted by permittees and other regulated persons in reporting forms and other forms supplying monitoring data; and

(iii) Verify the adequacy of sampling, monitoring, and other methods used by permittees and other regulated persons to develop that information;

(3) A program for investigating information obtained regarding violations of applicable program and permit requirements; and

(4) Procedures for receiving and ensuring proper consideration of information submitted by the Public about violations. Public effort in reporting violations shall be encouraged, and the State Director shall make available information on reporting procedures.

(c) The State Director and State officers engaged in compliance evaluation shall have authority to enter any site or premises subject to regulation or in which records relevant to program operation are kept in order to copy any records, inspect, monitor or otherwise investigate compliance with the State program including compliance with permit conditions and other program requirements. States whose law requires a search warrant before entry conform with this requirement.

(d) Investigatory inspections shall be conducted, samples shall be taken and other information shall be gathered in a manner (e.g., using proper "chain of custody" procedures) that will produce evidence admissible in an enforcement proceeding or in court.

(e) State NPDES compliance evaluation programs shall have procedures and ability for:

(1) Maintaining a comprehensive inventory of all sources covered by NPDES permits and a schedule of reports required to be submitted by permittees to the State agency;

(2) Initial screening (i.e., pre-enforcement evaluation) of all permit or grant-related compliance information to identify violations and to establish priorities for further substantive technical evaluation;

(3) When warranted, conducting a substantive technical evaluation following the initial screening of all permit or grant-related compliance information to determine the appropriate agency response;

(4) Maintaining a management information system which supports the compliance evaluation activities of this part; and

(5) Inspecting the facilities of all major dischargers and all Class I sludge management facilities (as defined in 40 CFR 501.2) where applicable at least annually.

[48 FR 14178, Apr. 1, 1983, as amended at 54 FR 18785, May 2, 1989]

§ 123.27 Requirements for enforcement authority.

(a) Any State agency administering a program shall have available the following remedies for violations of State program requirements:

(1) To restrain immediately and effectively any person by order or by suit in State court from engaging in any unauthorized activity which is endangering or causing damage to public health or the environment;

NOTE: This paragraph (a)(1) requires that States have a mechanism (e.g., an administrative cease and desist order or the ability to seek a temporary restraining order) to stop any unauthorized activity endangering public health or the environment.

(2) To sue in courts of competent jurisdiction to enjoin any threatened or continuing violation of any program requirement, including permit condi-

tions, without the necessity of a prior revocation of the permit;

(3) To assess or sue to recover in court civil penalties and to seek criminal remedies, including fines, as follows:

(i) Civil penalties shall be recoverable for the violation of any NPDES permit condition; any NPDES filing requirement; any duty to allow or carry out inspection, entry or monitoring activities; or, any regulation or orders issued by the State Director. These penalties shall be assessable in at least the amount of $5,000 a day for each violation.

(ii) Criminal fines shall be recoverable against any person who willfully or negligently violates any applicable standards or limitations; any NPDES permit condition; or any NPDES filing requirement. These fines shall be assessable in at least the amount of $10,000 a day for each violation.

NOTE: States which provide the criminal remedies based on "criminal negligence," "gross negligence" or strict liability satisfy the requirement of paragraph (a)(3)(ii) of this section.

(iii) Criminal fines shall be recoverable against any person who knowingly makes any false statement, representation or certification in any NPDES form, in any notice or report required by an NPDES permit, or who knowingly renders inaccurate any monitoring device or method required to be maintained by the Director. These fines shall be recoverable in at least the amount of $5,000 for each instance of violation.

NOTE: In many States the State Director will be represented in State courts by the State Attorney General or other appropriate legal officer. Although the State Director need not appear in court actions he or she should have power to request that any of the above actions be brought.

(b)(1) The maximum civil penalty or criminal fine (as provided in paragraph (a)(3) of this section) shall be assessable for each instance of violation and, if the violation is continuous, shall be assessable up to the maximum amount for each day of violation.

(2) The burden of proof and degree of knowledge or intent required under State law for establishing violations under paragraph (a)(3) of this section, shall be no greater than the burden of proof or degree of knowledge or intent EPA must provide when it brings an action under the appropriate Act;

NOTE: For example, this requirement is not met if State law includes mental state as an element of proof for civil violations.

(c) A civil penalty assessed, sought, or agreed upon by the State Director under paragraph (a)(3) of this section shall be appropriate to the violation.

NOTE: To the extent that State judgments or settlements provide penalties in amounts which EPA believes to be substantially inadequate in comparison to the amounts which EPA would require under similar facts, EPA, when authorized by the applicable statute, may commence separate actions for penalties.

Procedures for assessment by the State of the cost of investigations, inspections, or monitoring surveys which lead to the establishment of violations;

In addition to the requirements of this paragraph, the State may have other enforcement remedies. The following enforcement options, while not mandatory, are highly recommended:

Procedures which enable the State to assess or to sue any persons responsible for unauthorized activities for any expenses incurred by the State in removing, correcting, or terminating any adverse effects upon human health and the environment resulting from the unauthorized activity, whether or not accidental;

Procedures which enable the State to sue for compensation for any loss or destruction of wildlife, fish or aquatic life, or their habitat, and for any other damages caused by unauthorized activity, either to the State or to any residents of the State who are directly aggrieved by the unauthorized activity, or both; and

Procedures for the administrative assessment of penalties by the Director.

(d) Any State administering a program shall provide for public participation in the State enforcement process by providing either:

(1) Authority which allows intervention as of right in any civil or administrative action to obtain remedies specified in paragraphs (a)(1), (2) or (3) of this section by any citizen having an interest which is or may be adversely affected; or

(2) Assurance that the State agency or enforcement authority will:

(i) Investigate and provide written responses to all citizen complaints submitted pursuant to the procedures specified in § 123.26(b)(4);

(ii) Not oppose intervention by any citizen when permissive intervention may be authorized by statute, rule, or regulation; and

(iii) Publish notice of and provide at least 30 days for public comment on any proposed settlement of a State enforcement action.

Clean Water Act (33 U.S.C. 1251 *et seq.*),
Safe Drinking Water Act (42 U.S.C. 300f *et*
eq.), Clean Air Act (42 U.S.C. 7401 *et seq.*),
Resource Conservation and Recovery Act
42 U.S.C. 6901 *et seq.*))

48 FR 14178, Apr. 1, 1983, as amended at 48
R 39620, Sept. 1, 1983; 50 FR 6941, Feb. 19,
985; 54 FR 258, Jan. 4, 1989]

123.28 Control of disposal of pollutants into wells.

State law must provide authority to
sue permits to control the disposal of
ollutants into wells. Such authority
nall enable the State to protect the
ublic health and welfare and to pre-
ent the pollution of ground and sur-
ce waters by prohibiting well dis-
arges or by issuing permits for such
scharges with appropriate permit
rms and conditions. A program ap-
oved under section 1422 of SDWA
tisfies the requirements of this sec-
on.

ote: States which are authorized to ad-
nister the NPDES permit program under
tion 402 of CWA are encouraged to rely
existing statutory authority, to the
ent possible, in developing a State UIC
gram under section 1422 of SDWA. Sec-
n 402(b)(1)(D) of CWA requires that
DES States have the authority "to issue
mits which * * * control the disposal of
lutants into wells." In many instances,
refore, NPDES States will have existing
utory authority to regulate well disposal
ch satisfies the requirements of the UIC
gram. Note, however, that CWA excludes
ain types of well injections from the def-
ion of "pollutant." If the State's statuto-
uthority contains a similar exclusion it
need to be modified to qualify for UIC
gram approval.

3.29 Prohibition.

tate permit programs shall provide
t no permit shall be issued when
Regional Administrator has ob-
ed in writing under § 123.44.

Subpart C—Transfer of Information and Permit Review

§ 123.41 Sharing of information.

(a) Any information obtained or used in the administration of a State program shall be available to EPA upon request without restriction. If the information has been submitted to the State under a claim of confidentiality, the State must submit that claim to EPA when providing information under this section. Any information obtained from a State and subject to a claim of confidentiality will be treated in accordance with the regulations in 40 CFR Part 2. If EPA obtains from a State information that is not claimed to be confidential, EPA may make that information available to the public without further notice.

(b) EPA shall furnish to States with approved programs the information in its files not submitted under a claim of confidentiality which the State needs to implement its approved program. EPA shall furnish to States with approved programs information submitted to EPA under a claim of confidentiality, which the State needs to implement its approved program, subject to the conditions in 40 CFR Part 2.

§ 123.42 Receipt and use of Federal information.

Upon approving a State permit program, EPA shall send to the State agency administering the permit program any relevant information which was collected by EPA. The Memorandum of Agreement under § 123.24 shall provide for the following, in such manner as the State Director and the Regional Administrator shall agree:

(a) Prompt transmission to the State Director from the Regional Administrator of copies of any pending permit applications or any other relevant information collected before the approval of the State permit program and not already in the possession of the State Director. When existing permits are transferred to the State Director (e.g., for purposes of compliance monitoring, enforcement or reissuance), relevant information includes support files for permit issuance, compliance reports and records of enforcement actions.

(b) Procedures to ensure that the State Director will not issue a permit on the basis of any application received from the Regional Administrator which the Regional Administrator identifies as incomplete or otherwise deficient until the State Director receives information sufficient to correct the deficiency.

§ 123.43 Transmission of information to EPA.

(a) Each State agency administering a permit program shall transmit to the Regional Administrator copies of permit program forms and any other relevant information to the extent and in the manner agreed to by the State Director and Regional Administrator in the Memorandum of Agreement and not inconsistent with this part. Proposed permits shall be prepared by State agencies unless agreement to the contrary has been reached under § 123.44(j). The Memorandum of Agreement shall provide for the following:

(1) Prompt transmission to the Regional Administrator of a copy of all complete permit applications received by the State Director, except those for which permit review has been waived under § 123.24(d). The State shall supply EPA with copies of permit applications for which permit review has been waived whenever requested by EPA;

(2) Prompt transmission to the Regional Administrator of notice of every action taken by the State agency related to the consideration of any permit application or general permit, including a copy of each proposed or draft permit and any conditions, requirements, or documents which are related to the proposed or draft permit or which affect the authorization of the proposed permit, except those for which permit review has been waived under § 123.24(d). The State shall supply EPA with copies of notices for which permit review has been waived whenever requested by EPA; and

(3) Transmission to the Regional Administrator of a copy of every issued permit following issuance, along with any and all conditions, requirements, or documents which are related to c affect the authorization of the permi

(b) The State shall transmit a cop of each draft general permit or proposed general permit, except those fo separate storm sewers, to the EPA Director, Office of Water Enforcemen and Permits at the same time th draft general permit or proposed general permit is transmitted to the Regional Administrator under paragraph (a)(2) of this section.

(c) The State program shall provide for transmission by the State Director to EPA of:

(1) Notices from publicly owned treatment works under § 122.42(b) and 40 CFR Part 403, upon request of the Regional Administrator;

(2) A copy of any significant comments presented in writing pursuant to the public notice of a draft permit and a summary of any significant comments presented at any hearing on any draft permit, except those comments regarding permits for which permit review has been waived under § 123.24(d) and for which EPA has not otherwise requested receipt, if:

(i) The Regional Administrator requests this information; or

(ii) The proposed permit contains requirements significantly different from those contained in the tentative determination and draft permit; or

(iii) Significant comments objecting to the tentative determination and draft permit have been presented at the hearing or in writing pursuant to the public notice.

(d) Any State permit program shall keep such records and submit to the Administrator such information as the Administrator may reasonably require to ascertain whether the State program complies with the requirements of CWA or of this part.

§ 123.44 EPA review of and objections to State permits.

(a)(1) The Memorandum of Agreement shall provide a period of time (up to 90 days from receipt of proposed permits) to which the Regional Administrator may make general comments upon, objections to, or recommendations with respect to proposed permits. EPA reserves the right to take 90 days to supply specific grounds for objection, notwithstanding any shorter period specified in the Memorandum of Agreement, when a general objection is filed within the review period specified in the Memorandum of Agreement. The Regional Administrator shall send a copy of any comment, objection or recommendation to the permit applicant.

(2) In the case of general permits, EPA shall have 90 days from the date of receipt of the proposed general permit to comment upon, object to or make recommendations with respect to the proposed general permit, and is not bound by any shorter time limits set by the Memorandum of Agreement for general comments, objections or recommendations. The EPA Director, Office of Water Enforcement and Permits may comment upon, object to, or make recommendations with respect to proposed general permits, except those for separate storm sewers, on EPA's behalf.

(b)(1) Within the period of time provided under the Memorandum of Agreement for making general comments upon, objections to or recommendations with respect to proposed permits, the Regional Administrator shall notify the State Director of any objection to issuance of a proposed permit (except as provided in paragraph (a)(2) of this section for proposed general permits). This notification shall set forth in writing the general nature of the objection.

(2) Within 90 days following receipt of a proposed permit to which he or she has objected under paragraph (b)(1) of this section, or in the case of general permits within 90 days after receipt of the proposed general permit, the Regional Administrator, or in the case of general permits other than for separate storm sewers, the Regional Administrator or the EPA Director, Office of Water Enforcement and Permits, shall set forth in writing and transmit to the State Director:

(i) A statement of the reasons for the objection (including the section of CWA or regulations that support the objection), and

(ii) The actions that must be taken by the State Director to eliminate the objection (including the effluent limitations and conditions which the permit would include if it were issued by the Regional Administrator.)

NOTE: Paragraphs (a) and (b) of this section, in effect, modify any existing agreement between EPA and the State which provides less than 90 days for EPA to supply the specific grounds for an objection. However, when an agreement provides for an EPA review period of less than 90 days, EPA must file a general objection, in accordance with paragraph (b)(1) of this section within the time specified in the agreement. This general objection must be followed by a specific objection within the 90-day period. This modification to MOA's allows EPA to provide detailed information concerning acceptable permit conditions, as required by section 402(d) of CWA. To avoid possible confusion, MOA's should be changed to reflect this arrangement.

(c) The Regional Administrator's objection to the issuance of a proposed permit must be based upon one or more of the following grounds:

(1) The permit fails to apply, or to ensure compliance with, any applicable requirement of this part;

NOTE: For example, the Regional Administrator may object to a permit not requiring the achievement of required effluent limitations by applicable statutory deadlines.

(2) In the case of a proposed permit for which notification to the Administrator is required under section 402(b)(5) of CWA, the written recommendations of an affected State have not been accepted by the permitting State and the Regional Administrator finds the reasons for rejecting the recommendations are inadequate;

(3) The procedures followed in connection with formulation of the proposed permit failed in a material respect to comply with procedures required by CWA or by regulations thereunder or by the Memorandum of Agreement;

(4) Any finding made by the State Director in connection with the proposed permit misinterprets CWA or any guidelines or regulations under CWA, or misapplies them to the facts;

(5) Any provisions of the proposed permit relating to the maintenance of records, reporting, monitoring, sampling, or the provision of any other information by the permittee are inadequate, in the judgment of the Re-

gional Administrator, to assure compliance with permit conditions, including effluent standards and limitations or standards for sewage sludge use and disposal required by CWA, by the guidelines and regulations issued under CWA, or by the proposed permit;

(6) In the case of any proposed permit with respect to which applicable effluent standards and limitations or standards for sewage sludge use and disposal under sections 301, 302, 306, 307, 318, 403, and 405 of CWA have not yet been promulgated by the Agency, the proposed permit, in the judgment of the Regional Administrator, fails to carry out the provisions of CWA or of any regulations issued under CWA; the provisions of this paragraph apply to determinations made pursuant to § 125.3(c)(2) in the absence of applicable guidelines, to best management practices under section 304(e) of CWA, which must be incorporated into permits as requirements under section 301, 306, 307, 318, 403 or 405, and to sewage sludge use and disposal requirements developed on a case-by-case basis pursuant to section 405(d) of CWA, as the case may be;

(7) Issuance of the proposed permit would in any other respect be outside the requirements of CWA, or regulations issued under CWA.

(8) The effluent limits of a permit fail to satisfy the requirements of 40 CFR 122.44(d).

(d) Prior to notifying the State Director of an objection based upon any of the grounds set forth in paragraph (b) of this section, the Regional Administrator:

(1) Shall consider all data transmitted pursuant to § 123.43;

(2) May, if the information provided is inadequate to determine whether the proposed permit meets the guidelines and requirements of CWA, request the State Director to transmit to the Regional Administrator the complete record of the permit proceedings before the State, or any portions of the record that the Regional Administrator determines are necessary for review. If this request is made within 30 days of receipt of the State submittal under § 123.43, it shall constitute
an interim objection to the issuan
the permit, and the full period of
specified in the Memorandum
Agreement for the Regional Adm
trator's review shall recommence
the Regional Administrator has
ceived such record or portions of
record; and

(3) May, in his or her discretion,
to the extent feasible within
period of time available under
Memorandum of Agreement, affor
interested persons an opportunit
comment on the basis for the ob
tion;

(e) Within 90 days of receipt by
State Director of an objection by
Regional Administrator, the Stat
interstate agency or any intere
person may request that a public h
ing be held by the Regional Adm
trator on the objection. A public h
ing in accordance with the proced
of § 124.12 (c) and (d) shall be h
and public notice provided in acc
ance with § 124.10, whenever requ
ed by the State or the inters
agency which proposed the permi
if warranted by significant public
terest based on requests received.

(f) A public hearing held under p
graph (e) of this section shall be
ducted by the Regional Administra
and, at the Regional Administrat
discretion, with the assistance of
EPA panel designated by the Regio
Administrator, in an orderly and ex
ditious manner.

(g) Following the public hearing,
Regional Administrator shall reaff
the original objection, modify
terms of the objection, or withd
the objection, and shall notify
State of this decision.

(h)(1) If no public hearing is h
under paragraph (e) of this sect
and the State does not resubmit
permit revised to meet the Regio
Administrator's objection within
days of receipt of the objection,
Regional Administrator may issue
permit in accordance with Parts 1
122 and 124 of this chapter and a
other guidelines and requirements
CWA.

(2) If a public hearing is held und
paragraph (e) of this section, the R
gional Administrator does not wi
draw the objection, and the State do

not resubmit a permit revised to meet the Regional Administrator's objection or modified objection within 30 days of the date of the Regional Administrator's notification under paragraph (g) of this section, the Regional Administrator may issue the permit in accordance with Parts 121, 122 and 124 of this chapter and any other guidelines and requirements of CWA.

(3) Exclusive authority to issue the permit passes to EPA when the times set out in this paragraph expire.

(i) In the case of proposed general permits for discharges other than from separate storm sewers insert "or the EPA Director, Office of Water Enforcement and Permits" after "Regional Administrator" whenever it appears in paragraphs (c) through (h) of this section.

(j) The Regional Administrator may agree, in the Memorandum of Agreement under § 123.24, to review draft permits rather than proposed permits. In such a case, a proposed permit need not be prepared by the State and transmitted to the Regional Administrator for review in accordance with this section unless the State proposes to issue a permit which differs from the draft permit reviewed by the Regional Administrator, the Regional Administrator has objected to the draft permit, or there is significant public comment.

[48 FR 14178, Apr. 1, 1983, as amended at 54 FR 18785, May 2, 1989; 54 FR 23896, June 2, 1989]

§ 123.45 Noncompliance and program reporting by the Director.

The Director shall prepare quarterly, semi-annual, and annual reports as detailed below. When the State is the permit-issuing authority, the State Director shall submit all reports required under this section to the Regional Administrator, and the EPA Region in turn shall submit the State reports to EPA Headquarters. When EPA is the permit-issuing authority, the Regional Administrator shall submit all reports required under this section to EPA Headquarters.

(a) *Quarterly reports.* The Director shall submit quarterly narrative reports for major permittees as follows:

(1) *Format.* The report shall use the following format:

(i) Provide a separate list of major NPDES permittees which shall be subcategorized as non-POTWs, POTWs, and Federal permittees.

(ii) Alphabetize each list by permittee name. When two or more permittees have the same name, the permittee with the lowest permit number shall be entered first.

(iii) For each permittee on the list, include the following information in the following order:

(A) The name, location, and permit number.

(B) A brief description and date of each instance of noncompliance for which paragraph (a)(2) of this section requires reporting. Each listing shall indicate each specific provision of paragraph (a)(2) (e.g., (ii)(A) thru (iii)(G)) which describes the reason for reporting the violation on the quarterly report.

(C) The date(s), and a brief description of the action(s) taken by the Director to ensure compliance.

(D) The status of the instance(s) of noncompliance and the date noncompliance was resolved.

(E) Any details which tend to explain or mitigate the instance(s) of noncompliance.

(2) *Instances of noncompliance by major dischargers to be reported*—(i) *General.* Instances of noncompliance, as defined in paragraphs (a)(2)(ii) and (iii) of this section, by major dischargers shall be reported in successive reports until the noncompliance is reported as resolved (i.e., the permittee is no longer violating the permit conditions reported as noncompliance in the QNCR). Once an instance of noncompliance is reported as resolved in the QNCR, it need not appear in subsequent reports.

(A) All reported violations must be listed on the QNCR for the reporting period when the violation occurred, even if the violation is resolved during that reporting period.

(B) All permittees under current enforcement orders (i.e., administrative and judicial orders and consent decrees) for previous instances of noncompliance must be listed in the QNCR until the orders have been satisfied in full and the permittee is in compliance with permit conditions. If the permittee is in compliance with the enforcement order, but has not achieved full compliance with permit conditions, the compliance status shall be reported as "resolved pending," but the permittee will continue to be listed on the QNCR.

(ii) *Category I noncompliance.* The following instances of noncompliance by major dischargers are Category I noncompliance:

(A) Violations of conditions in enforcement orders except compliance schedules and reports.

(B) Violations of compliance schedule milestones for starting construction, completing construction, and attaining final compliance by 90 days or more from the date of the milestone specified in an enforcement order or a permit.

(C) Violations of permit effluent limits that exceed the Appendix A "Criteria for Noncompliance Reporting in the NPDES Program".

(D) Failure to provide a compliance schedule report for final compliance or a monitoring report. This applies when the permittee has failed to submit a final compliance schedule progress report, pretreatment report, or a Discharge Monitoring Report within 30 days from the due date specified in an enforcement order or a permit.

(iii) *Category II noncompliance.* Category II noncompliance includes violations of permit conditions which the Agency believes to be of substantial concern and may not meet the Category I criteria. The following are instances of noncompliance which must be reported as Category II noncompliance unless the same violation meets the criteria for Category I noncompliance:

(A) (*1*) Violation of a permit limit;

(*2*) An unauthorized bypass;

(*3*) An unpermitted discharge; or

(*4*) A pass-through of pollutants which causes or has the potential to cause a water quality problem (e.g., fish kills, oil sheens) or health problems (e.g., beach closings, fishing bans, or other restrictions of beneficial uses).

(B) Failure of an approved POT
implement its approved pretreatm
program adequately including fai
to enforce industrial pretreatment
quirements on industrial users as
quired in the approved program.

(C) Violations of any complia
schedule milestones (except th
milestones listed in paragr
(a)(2)(ii)(B) of this section) by 90 d
or more from the date specified in
enforcement order or a permit.

(D) Failure of the permittee to
vide reports (other than those rep
listed in paragraph (a)(2)(ii)(D) of
section) within 30 days from the
date specified in an enforcement or
or a permit.

(E) Instances when the required
ports provided by the permittee ar
deficient or incomplete as to ca
misunderstanding by the Director
thus impede the review of the st
of compliance.

(F) Violations of narrative requ
ments (e.g., requirements to deve
Spill Prevention Control and Coun
measure Plans and requirements
implement Best Management P
tices), which are of substantial
cern to the regulatory agency.

(G) Any other violation or group
permit violations which the Dire
or Regional Administrator consider
be of substantial concern.

(b) *Semi-annual statistical summ
report.* Summary information shal
provided twice a year on the num
of major permittees with two or m
violations of the same monthly a
age permit limitation in a six mo
period, including those otherwise
ported under paragraph (a) of this
tion. This report shall be submitted
the same time, according to the Fe
al fiscal year calendar, as the first a
third quarter QNCRs.

(c) *Annual reports for NPD*
Annual noncompliance report. Sta
tical reports shall be submitted by
Director on nonmajor NPDES per
tees indicating the total number
viewed, the number of noncompl
nonmajor permittees, the number
enforcement actions, and number
permit modifications extending c
pliance deadlines. The statistical in
mation shall be organized to fol

the types of noncompliance listed in paragraph (a) of this section.

(2) A separate list of nonmajor discharges which are one or more years behind in construction phases of the compliance schedule shall also be submitted in alphabetical order by name and permit number.

(d) *Schedule*—(1) *For all quarterly reports.* On the last working day of May, August, November, and February, the State Director shall submit to the Regional Administrator information concerning noncompliance with NPDES permit requirements by major dischargers in the State in acordance with the following schedule. The Regional Administrator shall prepare and submit information for EPA-issued permits to EPA Headquarters in accordance with the same schedule:

QUARTERS COVERED BY REPORTS ON NONCOMPLIANCE BY MAJOR DISCHARGERS:

[Date for completion of reports]

January, February, and March	[1] May 31
April, May, and June	[1] August 31
July, August, and September	[1] November 30
October, November, and December	[1] February 28

[1] Reports must be made available to the public for inspection and copying on this date.

(2) *For all annual reports.* The period for annual reports shall be for the calendar year ending December 31, with reports completed and available to the public no more than 60 days later.

(e) *Sludge noncompliance program reports.* The Director shall prepare and submit semi-annual noncompliance and annual program reports as required under 40 CFR 501.21. The Director may include this information in reports submitted in accordance with paragraphs (a) through (d) of this section.

(Approved by the Office of Management and Budget under control number 2040-0082)

[48 FR 14178, Apr. 1, 1983, as amended at 50 FR 34653, Aug. 26, 1985; 54 FR 18785, May 2, 1989]

APPENDIX A TO § 123.45—CRITERIA FOR NONCOMPLIANCE REPORTING IN THE NPDES PROGRAM

This appendix describes the criteria for reporting violations of NPDES permit effluent limits in the quarterly noncompliance report (QNCR) as specified under § 123.45(a)(2)(ii)(c). Any violation of an NPDES permit is a violation of the Clean Water Act (CWA) for which the permittee is liable. An agency's decision as to what enforcement action, if any, should be taken in such cases, will be based on an analysis of facts and legal requirements.

Violations of Permit Effluent Limits

Cases in which violations of permit effluent limits must be reported depend upon the magnitude and/or frequency of the violation. Effluent violations should be evaluated on a parameter-by-parameter and outfall-by-outfall basis. The criteria for reporting effluent violations are as follows:

a. Reporting Criteria for Violations of Monthly Average Permit Limits—Magnitude and Frequency

Violations of monthly average effluent limits which exceed or equal the product of the Technical Review Criteria (TRC) times the effluent limit, and occur two months in a six month period must be reported. TRCs are for two groups of pollutants.

Group I Pollutants—TRC = 1.4
Group II Pollutants—TRC = 1.2

b. Reporting Criteria for Chronic Violations of Monthly Average Limits

Chronic violations must be reported in the QNCR if the monthly average permit limits are exceeded any four months in a six-month period. These criteria apply to all Group I and Group II pollutants.

GROUP I POLLUTANTS—TRC = 1.4

Oxygen Demand

Biochemical Oxygen Demand
Chemical Oxygen Demand
Total Oxygen Demands
Total Organic Carbon
Other

Solids

Total Suspended Solids (Residues)
Total Dissolved Solids (Residues)
Other

Nutrients

Inorganic Phosphorus Compounds
Inorganic Nitrogen Compounds
Other

Detergents and Oils

MBAS
NTA
Oil and Grease
Other detergents or algicides

Minerals

Calcium
Chloride
Fluoride
Magnesium
Sodium
Potassium
Sulfur
Sulfate
Total Alkalinity
Total Hardness
Other Minerals

Metals

Aluminum
Cobalt
Iron
Vanadium

GROUP II POLLUTANTS—TRC = 1.2

METALS (ALL FORMS)

Other metals not specifically listed under Group I

Inorganic

Cyanide
Total Residual Chlorine

Organics

All organics are Group II except those specifically listed under Group I.

[50 FR 34654, Aug. 26, 1985]

§ 123.46 Individual control strategies.

(a) Not later than February 4, 1989, each State shall submit to the Regional Administrator for review, approval, and implementation an individual control strategy for each point source identified by the State pursuant to section 304(l)(1)(C) of the Act which will produce a reduction in the discharge of toxic pollutants from the point sources identified under section 304(l)(1)(C) through the establishment of effluent limitations under section 402 of the CWA and water quality standards under section 303(c)(2)(B) of the CWA, which reduction is sufficient, in combination with existing controls on point and nonpoint sources of pollution, to achieve the applicable water quality standard as soon as possible, but not later than three years after the date of the establishment of such strategy.

(b) The Administrator shall approve or disapprove the control strategies submitted by any State pursuant to paragraph (a) of this section, not later than June 4, 1989. If a State fails to submit control strategies in accordance with paragraph (a) of this section or the Administrator does not approve the control strategies submitted by such State in accordance with paragraph (a), then, not later than June 4, 1990, the Administrator in cooperation with such State and after notice and opportunity for public comment, shall implement the requirements of CWA section 304(l)(1) in such State. In the implementation of such requirements, the Administrator shall, at a minimum, consider for listing under CWA section 304(l)(1) any navigable waters for which any person submits a petition to the Administrator for listing not later than October 1, 1989.

(c) For the purposes of this section the term individual control strategy, as set forth in section 304(l) of the CWA, means a final NPDES permit with supporting documentation showing that effluent limits are consistent with an approved wasteload allocation or other documentation which shows that applicable water quality standards will be met not later than three years after the individual control strategy is established. Where a State is unable to issue a final permit on or before February 4, 1989, an individual control strategy may be a draft permit with an attached schedule (provided the State meets the schedule for issuing the final permit) indicating that the permit will be issued on or before February 4, 1990. If a point source is subject to section 304(l)(1)(C) of the CWA and is also subject to an on-site response action under sections 104 or 106 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), (42 U.S.C. 9601 et seq.), an individual control strategy may be the decision document (which incorporates the applicable or relevant and appropriate requirements under the CWA) prepared under sections 104 or 106 of CERCLA to address the release or threatened release of hazardous substances to the environment.

(d) A petition submitted pursuant to section 304(l)(3) of the CWA must be submitted to the appropriate Regional Administrator. Petitions must identify a waterbody in sufficient detail so that

PA is able to determine the location
d boundaries of the waterbody. The
tition must also identify the list or
ts for which the waterbody quali-
s, and the petition must explain
y the waterbody satisfies the crite-
for listing under CWA section
4(l) and 40 CFR 130.10(d)(6).

e) If the Regional Administrator
approves one or more individual
ntrol strategies, or if a State fails to
ovide adequate public notice and an
portunity to comment on the ICSs,
en, not later than June 4, 1989, the
gional Administrator shall give a
tice of approval or disapproval of
e individual control strategies sub-
tted by each State pursuant to this
tion as follows:

1) The notice of approval or disap-
val given under this paragraph
ll include the following:

) The name and address of the
A office that reviews the State's
mittals.

i) A brief description of the section
(l) process.

ii) A list of ICSs disapproved under
s section and a finding that the
Ss will not meet all applicable
iew criteria under this section and
tion 304(l) of the CWA.

v) If the Regional Administrator
ermines that a State did not pro-
e adequate public notice and an op-
tunity to comment on the waters,
nt sources, or ICSs prepared pursu-
to section 304(l), or if the Regional
ministrator chooses to exercise his
ner discretion, a list of the ICSs ap-
ved under this section, and a find-
that the ICSs satisfy all applicable
ew criteria.

) The location where interested
sons may examine EPA's records of
roval and disapproval.

i) The name, address, and tele-
ne number of the person at the
ional Office from whom interested
sons may obtain more information.

ii) Notice that written petitions or
ments are due within 120 days.

) The Regional Administrator
l provide the notice of approval or
pproval given under this para-
ph to the appropriate State Direc-
The Regional Administrator shall
lish a notice of availability, in a
y or weekly newspaper with Statewide circulation or in the FEDERAL REGISTER, for the notice of approval or disapproval. The Regional Administrator shall also provide written notice to each discharger identified under section 304(l)(1)(C), that EPA has listed the discharger under section 304(l)(1)(C).

(3) As soon as practicable but not later than June 4, 1990, the Regional Offices shall issue a response to petitions or comments received under section 304(l). The response to comments shall be given in the same manner as the notice described in paragraph (e) of this section except for the following changes:

(i) The lists of ICSs reflecting any changes made pursuant to comments or petitions received.

(ii) A brief description of the subsequent steps in the section 304(l) process.

(f) EPA shall review, and approve or disapprove, the individual control strategies prepared under section 304(l) of the CWA, using the applicable criteria set forth in section 304(l) of the CWA, and in 40 CFR Part 122, including § 122.44(d). At any time after the Regional Administrator disapproves an ICS (or conditionally aproves a draft permit as an ICS), the Regional Office may submit a written notification to the State that the Regional Office intends to issue the ICS. Upon mailing the notification, and notwithstanding any other regulation, exclusive authority to issue the permit passes to EPA.

[54 FR 256, Jan. 4, 1989, as amended at 54 FR 23896, June 2, 1989]

Subpart D—Program Approval, Revision, and Withdrawal

§ 123.61 Approval process.

(a) After determining that a State program submission is complete, EPA shall publish notice of the State's application in the FEDERAL REGISTER, and in enough of the largest newspapers in the State to attract statewide attention, and shall mail notice to persons known to be interested in such matters, including all persons on appropriate State and EPA mailing lists and all permit holders and applicants within the State. The notice shall:

(1) Provide a comment period of not less than 45 days during which interested members of the public may express their views on the State program;

(2) Provide for a public hearing within the State to be held no less than 30 days after notice is published in the FEDERAL REGISTER;

(3) Indicate the cost of obtaining a copy of the State's submission;

(4) Indicate where and when the State's submission may be reviewed by the public;

(5) Indicate whom an interested member of the public should contact with any questions; and

(6) Briefly outline the fundamental aspects of the State's proposed program, and the process for EPA review and decision.

(b) Within 90 days of the receipt of a complete program submission under § 123.21 the Administrator shall approve or disapprove the program based on the requirements of this part and of CWA and taking into consideration all comments received. A responsiveness summary shall be prepared by the Regional Office which identifies the public participation activities conducted, describes the matters presented to the public, summarizes significant comments received and explains the Agency's response to these comments.

(c) If the Administrator approves the State's program he or she shall notify the State and publish notice in the FEDERAL REGISTER. The Regional Administrator shall suspend the issuance of permits by EPA as of the date of program approval.

(d) If the Administrator disapproves the State program he or she shall notify the State of the reasons for disapproval and of any revisions or modifications to the State program which are necessary to obtain approval.

[48 FR 14178, Apr. 1, 1983; 50 FR 6941, Feb. 19, 1985]

§ 123.62 Procedures for revision of State programs.

(a) Either EPA or the approved State may initiate program revision. Program revision may be necessary when the controlling Federal or St statutory or regulatory authority modified or supplemented. The St shall keep EPA fully informed of proposed modifications to its b statutory or regulatory authority, forms, procedures, or priorities.

(b) Revision of a State program sh be accomplished as follows:

(1) The State shall submit a mo fied program description, Attorn General's statement, Memorandum Agreement, or such other documen as EPA determines to be necess under the circumstances.

(2) Whenever EPA determines th the proposed program revision is su stantial, EPA shall issue public noti and provide an opportunity to com ment for a period of at least 30 day The public notice shall be mailed interested persons and shall be pu lished in the FEDERAL REGISTER and enough of the largest newspapers the State to provide Statewide cove age. The public notice shall summari the proposed revisions and provide fo the opportunity to request a publi hearing. Such a hearing will be held there is significant public interes based on requests received.

(3) The Administrator shall approv or disapprove program revisions base on the requirements of this part an of the CWA.

(4) A program revision shall becom effective upon the approval of the Ad mi[illegible]istrator. Notice of approval of an substantial revision shall be publishe in the FEDERAL REGISTER. Notice of ap proval of non-substantial program re visions may be given by a letter fro the Administrator to the State Gover nor or his designee.

(c) States with approved program shall notify EPA whenever they pro pose to transfer all or part of any pro gram from the approved State agenc to any other State agency, and shal identify any new division of respons bilities among the agencies involve The new agency is not authorized t administer the program until ap proved by the Administrator unde paragraph (b) of this section. Organi zational charts required unde § 123.22(b) shall be revised and resub mitted.

(d) Whenever the Administrator has reason to believe that circumstances have changed with respect to a State program, he may request, and the State shall provide, a supplemental Attorney General's statement, program description, or such other documents or information as are necessary.

(e) *State NPDES programs only.* All new programs must comply with these regulations immediately upon approval. Any approved State section 402 permit program which requires revision to conform to this part shall be so revised within one year of the date of promulgation of these regulations, unless a State must amend or enact a statute in order to make the required revision in which case such revision shall take place within 2 years, except that revision of State programs to implement the requirements of 40 CFR Part 403 (pretreatment) shall be accomplished as provided in 40 CFR 403.10. In addition, approved States shall submit, within 6 months, copies of their permit forms for EPA review and approval. Approved States shall also assure that permit applicants, other than POTWs, submit, as part of their application, the information required under §§ 124.4(d) and 122.21 (g) or (h), as appropriate.

[48 FR 14178, Apr. 1, 1983, as amended at 49 FR 31842, Aug. 8, 1984; 50 FR 6941, Feb. 19, 1985; 53 FR 33007, Sept. 6, 1988]

§ 123.63 Criteria for withdrawal of State programs.

(a) The Administrator may withdraw program approval when a State program no longer complies with the requirements of this part, and the State fails to take corrective action. Such circumstances include the following:

(1) Where the State's legal authority no longer meets the requirements of this part, including:

(i) Failure of the State to promulgate or enact new authorities when necessary; or

(ii) Action by a State legislature or court striking down or limiting State authorities.

(2) Where the operation of the State program fails to comply with the requirements of this part, including:

(i) Failure to exercise control over activities required to be regulated under this part, including failure to issue permits;

(ii) Repeated issuance of permits which do not conform to the requirements of this part; or

(iii) Failure to comply with the public participation requirements of this part.

(3) Where the State's enforcement program fails to comply with the requirements of this part, including:

(i) Failure to act on violations of permits or other program requirements;

(ii) Failure to seek adequate enforcement penalties or to collect administrative fines when imposed; or

(iii) Failure to inspect and monitor activities subject to regulation.

(4) Where the State program fails to comply with the terms of the Memorandum of Agreement required under § 123.24.

(5) Where the State fails to develop an adequate regulatory program for developing water quality-based effluent limits in NPDES permits.

[48 FR 14178, Apr. 1, 1983; 50 FR 6941, Feb. 19, 1985, as amended at 54 FR 23897, June 2, 1989]

§ 123.64 Procedures for withdrawal of State programs.

(a) A State with a program approved under this part may voluntarily transfer program responsibilities required by Federal law to EPA by taking the following actions, or in such other manner as may be agreed upon with the Administrator.

(1) The State shall give the Administrator 180 days notice of the proposed transfer and shall submit a plan for the orderly transfer of all relevant program information not in the possession of EPA (such as permits, permit files, compliance files, reports, permit applications) which are necessary for EPA to administer the program.

(2) Within 60 days of receiving the notice and transfer plan, the Administrator shall evaluate the State's transfer plan and shall identify any additional information needed by the Federal government for program adminis-

tration and/or identify any other deficiencies in the plan.

(3) At least 30 days before the transfer is to occur the Administrator shall publish notice of the transfer in the FEDERAL REGISTER and in enough of the largest newspapers in the State to provide Statewide coverage, and shall mail notice to all permit holders, permit applicants, other regulated persons and other interested persons on appropriate EPA and State mailing lists.

(b) The following procedures apply when the Administrator orders the commencement of proceedings to determine whether to withdraw approval of a State program.

(1) *Order.* The Administrator may order the commencement of withdrawal proceedings on his or her own initiative or in response to a petition from an interested person alleging failure of the State to comply with the requirements of this part as set forth in § 123.63. The Administrator shall respond in writing to any petition to commence withdrawal proceedings. He may conduct an informal investigation of the allegations in the petition to determine whether cause exists to commence proceedings under this paragraph. The Administrator's order commencing proceedings under this paragraph shall fix a time and place for the commencement of the hearing and shall specify the allegations against the State which are to be considered at the hearing. Within 30 days the State shall admit or deny these allegations in a written answer. The party seeking withdrawal of the State's program shall have the burden of coming forward with the evidence in a hearing under this paragraph.

(2) *Definitions.* For purposes of this paragraph the definitions of "Act," "Administrative Law Judge," "Hearing Clerk," and "Presiding Officer" in 40 CFR 22.03 apply in addition to the following:

(i) "Party" means the petitioner, the State, the Agency, and any other person whose request to participate as a party is granted.

(ii) "Person" means the Agency, the State and any individual or organization having an interest in the subject matter of the proceeding.

(iii) "Petitioner" means any person whose petition for commencement of withdrawal proceedings has been granted by the Administrator.

(3) *Procedures.* (i) The following provisions of 40 CFR Part 22 (Consolidated Rules of Practice) are applicable to proceedings under this paragraph:

(A) § 22.02—(use of number/gender);

(B) § 22.04(c)—(authorities of Presiding Officer);

(C) § 22.06—(filing/service of rulings and orders);

(D) § 22.09—(examination of filed documents);

(E) § 22.19(a), (b) and (c)—(prehearing conference);

(F) § 22.22—(evidence);

(G) § 22.23—(objections/offers of proof);

(H) § 22.25—(filing the transcript); and

(I) § 22.26—(findings/conclusions).

(ii) The following provisions are also applicable:

(A) *Computation and extension of time*—(*1*) *Computation.* In computing any period of time prescribed or allowed in these rules of practice, except as otherwise provided, the day of the event from which the designated period begins to run shall not be included. Saturdays, Sundays, and Federal legal holidays shall be included. When a stated time expires on a Saturday, Sunday, or legal holiday, the stated time period shall be extended to include the next business day.

(*2*) *Extensions of time.* The Administrator, Regional Administrator, or Presiding Officer, as appropriate, may grant an extension of time for the filing of any pleading, document, or motion (*i*) upon timely motion of a party to the proceeding, for good cause shown, and after consideration of prejudice to other parties, or (*ii*) upon his own motion. Such a motion by a party may only be made after notice to all other parties, unless the movant can show good cause why serving notice is impracticable. The motion shall be filed in advance of the date on which the pleading, document or motion is due to be filed, unless the failure of a party to make timely motion for extension of time was the result of excusable neglect.

(*3*) The time for commencement of the hearing shall not be extended beyond the date set in the Administrator's order without approval of the Administrator.

(B) *Ex parte discussion of proceeding.* At no time after the issuance of the order commencing proceedings shall the Administrator, Regional Administrator, Judicial Officer, Regional Judicial Officer, Presiding Officer, or any other person who is likely to advise these officials in the decision on the case, discuss ex parte the merits of the proceeding with any interested person outside the Agency, with any Agency staff member who performs a prosecutorial or investigative function in such proceeding or a factually related proceeding, or with any representative of such person. Any ex parte memorandum or other communication addressed to the Administrator, Regional Administrator, Judicial Officer, Regional Judicial Officer, or the Presiding Officer during the pendency of the proceeding and relating to the merits thereof, by or on behalf of any party shall be regarded as argument made in the proceeding and shall be served upon all other parties. The other parties shall be given an opportunity to reply to such memorandum or communication.

(C) *Intervention—(1) Motion.* A motion for leave to intervene in any proceeding conducted under these ules of practice must set forth the rounds for the proposed intervention, he position and interest of the novant and the likely impact that ntervention will have on the expeditious progress of the proceeding. Any erson already a party to the proceedng may file an answer to a motion to ntervene, making specific reference to ne factors set forth in the foregoing entence and paragraph)(3)(ii)(C)(*3*) of this section, within n (10) days after service of the otion for leave to intervene.

(*2*) However, motions to intervene ust be filed within 15 days from the te the notice of the Administrator's der is first published.

3) Disposition. Leave to intervene y be granted only if the movant monstrates that (*i*) his presence in proceeding would not unduly prolong or otherwise prejudice that adjudication of the rights of the original parties; (*ii*) the movant will be adversely affected by a final order; and (*iii*) the interests of the movant are not being adequately represented by the original parties. The intervenor shall become a full party to the proceeding upon the granting of leave to intervene.

(*4*) *Amicus curiae.* Persons not parties to the proceeding who wish to file briefs may so move. The motion shall identify the interest of the applicant and shall state the reasons why the proposed amicus brief is desirable. If the motion is granted, the Presiding Officer or Administrator shall issue an order setting the time for filing such brief. An amicus curiae is eligible to participate in any briefing after his motion is granted, and shall be served with all briefs, reply briefs, motions, and orders relating to issues to be briefed.

(D) *Motions—(1) General.* All motions, except those made orally on the record during a hearing, shall (*i*) be in writing; (*ii*) state the grounds therefor with particularity; (*iii*) set forth the relief or order sought; and (*iv*) be accompanied by any affidavit, certificate, other evidence, or legal memorandum relied upon. Such motions shall be served as provided by paragraph (b)(4) of this section.

(*2*) *Response to motions.* A party's response to any written motion must be filed within ten (10) days after service of such motion, unless additional time is allowed for such response. The response shall be accompanied by any affidavit, certificate, other evidence, or legal memorandum relied upon. If no response is filed within the designated period, the parties may be deemed to have waived any objection to the granting of the motion. The Presiding Officer, Regional Administrator, or Administrator, as appropriate, may set a shorter time for response, or make such other orders concerning the disposition of motions as they deem appropriate.

(*3*) *Decision.* The Administrator shall rule on all motions filed or made after service of the recommended decision upon the parties. The Presiding Officer shall rule on all other motions.

Oral argument on motions will be permitted where the Presiding Officer, Regional Administrator, or the Administrator considers it necessary or desirable.

(4) *Record of proceedings.* (i) The hearing shall be either stenographically reported verbatim or tape recorded, and thereupon transcribed by an official reporter designated by the Presiding Officer;

(ii) All orders issued by the Presiding Officer, transcripts of testimony, written statements of position, stipulations, exhibits, motions, briefs, and other written material of any kind submitted in the hearing shall be a part of the record and shall be available for inspection or copying in the Office of the Hearing Clerk, upon payment of costs. Inquiries may be made at the Office of the Administrative Law Judges, Hearing Clerk, 401 M Street, SW, Washington, D.C. 20460;

(iii) Upon notice to all parties the Presiding Officer may authorize corrections to the transcript which involves matters of substance;

(iv) An original and two (2) copies of all written submissions to the hearing shall be filed with the Hearing Clerk;

(v) A copy of each submission shall be served by the person making the submission upon the Presiding Officer and each party of record. Service under this paragraph shall take place by mail or personal delivery;

(vi) Every submission shall be accompanied by an acknowledgement of service by the person served or proof of service in the form of a statement of the date, time, and manner of service and the names of the persons served, certified by the person who made service, and;

(vii) The Hearing Clerk shall maintain and furnish to any person upon request, a list containing the name, service address, and telephone number of all parties and their attorneys or duly authorized representatives.

(5) *Participation by a person not a party.* A person who is not a party may, in the discretion of the Presiding Officer, be permitted to make a limited appearance by making oral or written statement of his/her position on the issues within such limits and on such conditions as may be fixed by the Presiding Officer, but he/she may not otherwise participate in the proceeding.

(6) *Rights of parties.* (i) All parties to the proceeding may:

(A) Appear by counsel or other representative in all hearing and prehearing proceedings;

(B) Agree to stipulations of facts which shall be made a part of the record.

(7) *Recommended decision.* (i) Within 30 days after the filing of proposed findings and conclusions, and reply briefs, the Presiding Officer shall evaluate the record before him/her, the proposed findings and conclusions and any briefs filed by the parties and shall prepare a recommended decision, and shall certify the entire record, including the recommended decision, to the Administrator.

(ii) Copies of the recommended decision shall be served upon all parties.

(iii) Within 20 days after the certification and filing of the record and recommended decision, all parties may file with the Administrator exceptions to the recommended decision and a supporting brief.

(8) *Decision by Administrator.* (i) Within 60 days after the certification of the record and filing of the Presiding Officer's recommeded decision, the Administrator shall review the record before him and issue his own decision.

(ii) If the Administrator concludes that the State has administered the program in conformity with the appropriate Act and regulations his decision shall constitute "final agency action" within the meaning of 5 U.S.C. 704.

(iii) If the Administrator concludes that the State has not administered the program in conformity with the appropriate Act and regulations he shall list the deficiencies in the program and provide the State a reasonable time, not to exceed 90 days, to take such appropriate corrective action as the Administrator determines necessary.

(iv) Within the time prescribed by the Administrator the State shall take such appropriate corrective action as required by the Administrator and shall file with the Administrator and all parties a statement certified by the

State Director that such appropriate corrective action has been taken.

(v) The Administrator may require a further showing in addition to the certified statement that corrective action has been taken.

(vi) If the State fails to take such appropriate corrective action and file a certified statement thereof within the time prescribed by the Administrator, the Administrator shall issue a supplementary order withdrawing approval of the State program. If the State akes such appropriate corrective action, the Administrator shall issue a upplementary order stating that approval of authority is not withdrawn.

(vii) The Administrator's supplemenary order shall constitute final agency action within the meaning of 5 U.S.C. 704.

(viii) Withdrawal of authorization nder this section and the appropriate ct does not relieve any person from omplying with the requirements of tate law, nor does it affect the validi- y of actions by the State prior to ithdrawal.

8 FR 14178, Apr. 1, 1983; 50 FR 6941, Feb. , 1985]

PART 124—PROCEDURES FOR DECISIONMAKING

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APPENDIX A TO PART 124—GUIDE TO DECISIONMAKING UNDER PART 124

AUTHORITY: Resource Conservation and Recovery Act, 42 U.S.C. 6901 *et seq.*; Safe Drinking Water Act, 42 U.S.C. 300(f) *et seq.*; Clean Water Act, 33 U.S.C. 1251 *et seq.*; and Clean Air Act, 42 U.S.C. 1857 *et seq.*

SOURCE: 48 FR 14264, Apr. 1, 1983, unless otherwise noted.

Subpart A—General Program Requirements

§ 124.1 Purpose and scope.

(a) This part contains EPA proc dures for issuing, modifying, revokin and reissuing, or terminating a RCRA, UIC, PSD and NPDES "pe mits" (including "sludge-only" permit issued pursuant to § 122.1(b)(3)), othe than RCRA and UIC "emergency pe mits" (see §§ 270.61 and 144.34) an RCRA "permits by rule" (§ 270.60 The latter kinds of permits are gov erned by Part 270. RCRA interin status and UIC authorization by rul are not "permits" and are covered b specific provisions in Parts 144, Sub part C, and 270. This part also doe not apply to permits issued, modified revoked and reissued or terminated by the Corps of Engineers. Those proce dures are specified in 33 CFR Part 320-327. The procedures of this par also apply to denial of a permit for the active life of a RCRA hazardous waste management facility or unit under § 270.29.

(b) Part 124 is organized into six subparts. Subpart A contains general procedural requirements applicable to all permit programs covered by these regulations. Subparts B through F supplement these general provisions with requirements that apply to only one or more of the programs. Subpart A describes the steps EPA will follow in receiving permit applications, preparing draft permits, issuing public notice, inviting public comment and holding public hearings on draft permits. Subpart A also covers assembling an administrative record, responding to comments, issuing a final permit decision, and allowing for administrative appeal of the final permit decision. Subpart B is reserved for specific procedural requirements for RCRA permits. There are none of these at present but they may be added in the future. Subpart C contains definitions and specific procedural requirements for PSD permits. Subpart D applies to NPDES permits until an evidentiary hearing begins, when Subpart E procedures take over for EPA-issued NPDES permits and EPA-terminated RCRA permits. Subpart F, which is based on the "initial licensing" provisions of the Administrative Procedure Act (APA), can be used instead of Subparts A through E in appropriate cases.

(c) Part 124 offers an opportunity for three kinds of hearings: A public hearing under Subpart A, an evidentiary hearing under Subpart E, and a panel hearing under Subpart F. This chart describes when these hearings are available for each of the five permit programs.

HEARINGS AVAILABLE UNDER THIS PART

Programs	Subpart		
	(A)	(E)	(F)
	Public hearing	Evidentiary hearing	Panel hearing
RCRA	On draft permit, at Director's discretion or on request (§ 124.12).	(1) Permit termination (RCRA section 3008). (2) With NPDES evidentiary hearing (§ 124.74(b)(2)).	(1) At RA's discretion in lieu of public hearing (§§ 124.12 and 124.111(a)(3)). (2) When consolidated with NPDES draft permit processed under Subpart F (§ 124.111(a)(1)(i)).
UIC	On draft permit, at Director's discretion or on request (§ 124.12).	With NPDES evidentiary hearing (§ 124.74(b)(2)).	(1) At RA's discretion in lieu of public hearing (§§ 124.12 and 124.111(a)(3)). (2) When consolidated with NPDES draft permit processed under Subpart F (§ 124.111(a)(1)(i)).
PSD	On draft permit, at Director's discretion or on request (§ 124.12).	Not available (§ 124.71(c))	When consolidated with NPDES draft permit processed under Subpart F if RA determines that CAA one year deadline will not be violated.
NPDES (other than general permit).	On draft permit, at Director's discretion or on request (§ 124.12).	(1) On request to challenge any permit condition or variance (§ 124.74). (2) At RA's discretion for any 301(h) request (§ 124.64(b)).	(1) At RA's discretion when first decision on permit or variance request (§ 124.111). (2) At RA's discretion when request for evidentiary hearing is granted under § 124.75(a)(2) (§§ 124.74(c)(8) and 124.111(a)(2)). (3) At RA's discretion for any 301(h) request (§ 124.64(b)).
NPDES (general permit).	On draft permit, at Director's discretion or on request (§ 124.12).	Not available (§ 124.71(a))	At RA's discretion in lieu of public hearing (§ 124.111(a)(3)).
404	On draft permit or on application when no draft permit, at Director's discretion or on request (§ 124.12).	Not available (§ 124.71)	Not available (§ 124.111).

(d) This part is designed to allow permits for a given facility under two or more of the listed programs to be processed separately or together at the choice of the Regional Administrator. This allows EPA to combine the processing of permits only when appropriate, and not necessarily in all cases. The Regional Administrator may consolidate permit processing when the permit applications are submitted, when draft permits are prepared, or when final permit decisions re issued. This part also allows conolidated permits to be subject to a ingle public hearing under § 124.12, a ingle evidentiary hearing under § 124.75, or a single non-adversary panel hearing under § 124.120. Permit applicants may recommend whether or not their applications should be consolidated in any given case.

(e) Certain procedural requirements set forth in Part 124 must be adopted by States in order to gain EPA approval to operate RCRA, UIC, NPDES, and 404 permit programs.These requirements are listed in §§ 123.25 (NPDES), 145.11 (UIC), 233.26 (404), and 271.14 (RCRA) and signaled by the following words at the end of the appropriate Part 124 section or paragraph heading: (*applicable to State programs see §§ 123.25* (*NPDES*), *145.11* (*UIC*), *233.26 (404), and 271.14 (RCRA)).* Part 124 does not apply to PSD permits issued by an approved State.

(f) To coordinate decisionmaking when different permits will be issued by EPA and approved State programs, this part allows applications to be jointly processed, joint comment periods and hearings to be held, and final permits to be issued on a cooperative basis whenever EPA and a State agree to take such steps in general or in individual cases. These joint processing agreements may be provided in the Memorandum of Agreement developed under §§ 123.24 (NPDES), 145.24 (UIC), 233.24 (404), and 271.8 (RCRA).

[48 FR 14264, Apr. 1, 1983, as amended at 54 FR 9607, Mar. 7, 1989; 54 FR 18785, May 2, 1989]

§ 124.2 Definitions.

(a) In addition to the definitions given in §§ 122.2 and 123.2 (NPDES), 501.2 (sludge management), 144.3 and 145.2 (UIC), 233.3 (404), and 270.2 and 271.2 (RCRA), the definitions below apply to this Part, except for PSD permits which are governed by the definitions in § 124.41. Terms not defined in this section have the meaning given by the appropriate Act.

Administrator means the Administrator of the U.S. Environmental Protection Agency, or an authorized representative.

Applicable standards and limitations means all State, interstate, and federal standards and limitations to which a "discharge," a "sludge use or disposal practice" or a related activity is subject under the CWA, including "standards for sewage sludge use or disposal," "effluent limitations," water quality standards, standards of performance, toxic effluent standards or prohibitions, "best management practices," and pretreatment standards under sections 301, 302, 303, 304, 306, 307, 308, 403, and 405 of CWA.

Application means the EPA standard national forms for applying for a permit, including any additions, revisions or modifications to the forms; or forms approved by EPA for use in "approved States," including any approved modifications or revisions. For RCRA, application also includes the information required by the Director under §§ 270.14 through 270.29 [contents of Part B of the RCRA application].

Appropriate Act and regulation means the Clean Water Act (CWA the Solid Waste Disposal Act, a amended by the Resource Conservation Recovery Act (RCRA); or Saf Drinking Water Act (SDWA), whichever is applicable; and applicable regulations promulgated under those statutes. In the case of an "approved Stat program" appropriate Act and regulations includes program requirements.

Consultation with the Regional Administrator (§ 124.62(a)(2)) mean review by the Regional Administrato following evaluation by a panel of th technical merits of all 301(k) applications approved by the Director. Th panel (to be appointed by the Directo of the Office of Water Enforcemen and Permits) will consist of Headquarters, Regional, and State personnel familiar with the industrial category in question.

CWA means the Clean Water Ac (formerly referred to as the Federa Water Pollution Control Act of Federal Pollution Control Act Amendments of 1972) Pub. L. 92-500, as amended by Pub. L. 95-217 and Pub. L. 95-576; 33 U.S.C. 1251 *et seq.*

Director means the Regional Administrator, the State director or the Tribal director as the context requires or an authorized representative. When there is no approved State or Tribal program, and there is an EPA administered program, "Director" means the Regional Administrator. When there is an approved State or Tribal program, "Director" normally means the State or Tribal director. In some circumstances, however, EPA retains the authority to take certain actions even when there is an approved State or Tribal program. (For example, when EPA has issued an NPDES permit prior to the approval of a State program, EPA may retain jurisdiction over that permit after program approval; see § 123.1) In such cases, the term "Director" means the Regional Administrator and not the State or Tribal director.

Draft permit means a document prepared under § 124.6 indicating the Director's tentative decision to issue or deny, modify, revoke and reissue, terminate, or reissue a "permit." A notice of intent to terminate a permit and a notice of intent to deny a permit as discussed in § 124.5, are types of "draft permits." A denial of a request for modification, revocation and reissuance or termination, as discussed in § 124.5, is not a "draft permit." A "proposal permit" is not a "draft permit."

EPA ("EPA") means the United States "Environmental Protection Agency."

Facility or activity means any "HWM facility," UIC "injection well," NPDES "point source" or "treatment works treating domestic sewage" or State 404 dredge or fill activity, or any other facility or activity (including land or appurtenances thereto) that is subject to regulation under the RCRA, UIC, NPDES, or 404 programs.

General permit (NPDES and 404) means an NPDES or 404 "permit" authorizing a category of discharges or activities under the CWA within a geographical area. For NPDES, a general permit means a permit issued under § 122.28. For 404, a general permit means a permit issued under § 233.37.

Indian Tribe means (except in the case of RCRA) any Indian Tribe having a Federally recognized governing body carrying out substantial governmental duties and powers over a defined area.

Interstate agency means an agency of two or more States established by or under an agreement or compact approved by the Congress, or any other agency of two or more States having substantial powers or duties pertaining to the control of pollution as determined and approved by the Administrator under the "appropriate Act and regulations."

Major facility means any RCRA, UIC, NPDES, or 404 "facility or activity" classified as such by the Regional Administrator, or, in the case of "approved State programs," the Regional Administrator in conjunction with the State Director.

NPDES means National Pollutant Discharge Elimination System.

Owner or operator means owner or operator of any "facility or activity" subject to regulation under the RCRA, UIC, NPDES, or 404 programs.

Permit means an authorization, license, or equivalent control document issued by EPA or an "approved State" to implement the requirements of this part and Parts 122, 123, 144, 145, 233, 270, and 271. "Permit" includes RCRA "permit by rule" (§ 270.60), UIC area permit (§ 144.33), NPDES or 404 "general permit" (§§ 270.61, 144.34, and 233.38). Permit does not include RCRA interim status (§ 270.70), UIC authorization by rule (§ 144.21), or any permit which has not yet been the subject of final agency action, such as a "draft permit" or a "proposed permit."

Person means an individual, association, partnership, corporation, municipality, State, Federal, or Tribal agency, or an agency or employee thereof.

RCRA means the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976 (Pub. L. 94-580, as amended by Pub. L. 95-609, 42 U.S.C. 6901 *et seq*).

Regional Administrator means the Regional Administrator of the appropriate Regional Office of the Environmental Protection Agency or the authorized representative of the Regional Administrator.

Schedule of compliance means a schedule of remedial measures included in a "permit," including an enforceable sequence of interim requirements (for example, actions, operations, or milestone events) leading to compliance with the "appropriate Act and regulations."

SDWA means the Safe Drinking Water Act (Pub. L. 95-523, as amended by Pub. L. 95-1900; 42 U.S.C. 300f *et seq*).

Section 404 program or State 404 program or 404 means an "approved State program" to regulate the "discharge of dredged material" and the "discharge of fill material" under section 404 of the Clean Water Act in "State regulated waters."

Site means the land or water area where any "facility or activity" is physically located or conducted, including adjacent land used in connection with the facility or activity.

State means one of the States of the United States, the District of Columbia, the Commonwealth of Puerto

Rico, the Virgin Islands, Guam, American Samoa, the Trust Territory of the Pacific Islands (except in the case of RCRA), the Commonwealth of the Northern Mariana Islands, or an Indian Tribe treated as a State (except in the case of RCRA). "State Director" means the chief administrative officer of any State, interstate, or Tribal agency operating an approved program, or the delegated representative of the State director. If the responsibility is divided among two or more States, interstate, or Tribal agencies, "State Director" means the chief administrative officer of the State, interstate, or Tribal agency authorized to perform the particular procedure or function to which reference is made.

State Director means the chief administrative officer of any State or interstate agency operating an "approved program," or the delegated representative of the state Director. If responsibility is divided among two or more State or interstate agencies, "State Director" means the chief administrative officer of the State or interstate agency authorized to perform the particular procedure or function to which reference is made.

UIC means the Underground Injection Control program under Part C of the Safe Drinking Water Act, including an "approved program."

Variance (NPDES) means any mechanism or provision under section 301 or 316 of CWA or under 40 CFR Part 125, or in the applicable "effluent limitations guidelines" which allows modification to or waiver of the generally applicable effluent limitation requirements or time deadlines of CWA. This includes provisions which allow the establishment of alternative limitations based on fundamentally different factors or on sections 301(c), 301(g), 301(h), 301(i), or 316(a) of CWA.

(b) For the purposes of Part 124, the term "Director" means the State Director or Regional Administrator and is used when the accompanying provision is required of EPA-administered programs and of State programs under §§ 123.25 (NPDES), 145.11 (UIC), 233.26 (404), and 271.14 (RCRA). The term "Regional Administrator" is used when the accompanying provision applies exclusively to EPA-issued permits and is not applicable to State programs under these sections. While States are not required to implement these latter provisions, they are not precluded from doing so, notwithstanding use of the term "Regional Administrator."

(c) The term "formal hearing" means any evidentiary hearing under Subpart E or any panel hearing under Subpart F but does not mean a public hearing conducted under § 124.12.

[48 FR 14264, Apr. 1, 1983; 48 FR 30115, June 30, 1983, as amended at 49 FR 25981, June 25, 1984; 53 FR 37410, Sept. 26, 1988; 54 FR 18785, May 2, 1989]

§ 124.3 Application for a permit.

(a) *Applicable to State programs, see §§ 123.25 (NPDES), 145.11 (UIC), 233.26 (404), and 271.14 (RCRA).* (1) Any person who requires a permit under the RCRA, UIC, NPDES, or PSD programs shall complete, sign, and submit to the Director an application for each permit required under §§ 270.1 (RCRA), 144.1 (UIC), 40 CFR 52.21 (PSD), and 122.1 (NPDES). Applications are not required for RCRA permits by rule (§ 270.60), underground injections authorized by rules (§§ 144.21 through 144.26), NPDES general permits (§ 122.28) and 404 general permits (§ 233.37).

(2) The Director shall not begin the processing of a permit until the applicant has fully complied with the application requirements for that permit. See §§ 270.10, 270.13 (RCRA), 144.31 (UIC), 40 CFR 52.21 (PSD), and 122.21 (NPDES).

(3) Permit applications (except for PSD permits) must comply with the signature and certification requirements of §§ 122.22 (NPDES), 144.32 (UIC), 233.6 (404), and 270.11 (RCRA).

(b) [Reserved]

(c) The Regional Administrator shall review for completeness every application for an EPA-issued permit. Each application for an EPA-issued permit submitted by a new HWM facility, a new UIC injection well, a major PSD stationary source or major PSD modification, or an NPDES new source or NPDES new discharger should be reviewed for completeness by the Regional Administrator within 30 days of its receipt. Each application for an EPA-issued permit submitted by an existing HWM facility (both Parts A and B of the application), existing injection well or existing NPDES source or sludge-only facility should be reviewed for completeness within 60 days of receipt. Upon completing the review, the Regional Administrator shall notify the applicant in writing whether the application is complete. If the application is incomplete, the Regional Administrator shall list the information necessary to make the application complete. When the application is for an existing HWM facility, an existing UIC injection well or an existing NPDES source or "sludge-only facility" the Regional Administrator shall specify in the notice of deficiency a date for submitting the necessary information. The Regional Administrator shall notify the applicant that the application is complete upon receiving this information. After the application is completed, the Regional Administrator may request additional information from an applicant but only when necessary to clarify, modify, or supplement previously submitted material. Requests for such additional information will not render an application incomplete.

(d) If an applicant fails or refuses to correct deficiencies in the application, the permit may be denied and appropriate enforcement actions may be taken under the applicable statutory provision including RCRA section 3008, SDWA sections 1423 and 1424, CAA section 167, and CWA sections 08, 309, 402(h), and 402(k).

(e) If the Regional Administrator de-ides that a site visit is necessary for ny reason in conjunction with the rocessing of an application, he or she hall notify the applicant and a date hall be scheduled.

(f) The effective date of an applica-on is the date on which the Regional dministrator notifies the applicant at the application is complete as rovided in paragraph (c) of this secon.

(g) For each application from a ajor new HWM facility, major new IC injection well, major NPDES new urce, major NPDES new discharger, a permit to be issued under provisions of § 122.28(c), the Regional Administrator shall, no later than the effective date of the application, prepare and mail to the applicant a project decision schedule. (This paragraph does not apply to PSD permits.) The schedule shall specify target dates by which the Regional Administrator intends to:

(1) Prepare a draft permit;

(2) Give public notice;

(3) Complete the public comment period, including any public hearing;

(4) Issue a final permit; and

(5) In the case of an NPDES permit, complete any formal proceedings under Subpart E or F.

(Clean Water Act (33 U.S.C. 1251 *et seq.*), Safe Drinking Water Act (42 U.S.C. 300f *et seq.*), Clean Air Act (42 U.S.C. 7401 *et seq.*), Resource Conservation and Recovery Act (42 U.S.C. 6901 *et seq.*))

[48 FR 14264, Apr. 1, 1983, as amended at 48 FR 39620, Sept. 1, 1983; 54 FR 18785, May 2, 1989]

§ 124.4 Consolidation of permit processing.

(a)(1) Whenever a facility or activity requires a permit under more than one statute covered by these regulations, processing of two or more applications for those permits may be consolidated. The first step in consolidation is to prepare each draft permit at the same time.

(2) Whenever draft permits are prepared at the same time, the statements of basis (required under § 124.7 for EPA-issued permits only) or fact sheets (§ 124.8), administrative records (required under § 124.9 for EPA-issued permits only), public comment periods (§ 124.10), and any public hearings (§ 124.12) on those permits should also be consolidated. The final permits may be issued together. They need not be issued together if in the judgment of the Regional Administrator or State Director(s), joint processing would result in unreasonable delay in the issuance of one or more permits.

(b) Whenever an existing facility or activity requires additional permits under one or more of the statutes covered by these regulations, the permitting authority may coordinate the expiration date(s) of the new permit(s) with the expiration date(s) of the existing permit(s) so that all permits expire simultaneously. Processing of the subsequent applications for renewal permits may then be consolidated.

(c) Processing of permit applications under paragraph (a) or (b) of this section may be consolidated as follows:

(1) The Director may consolidate permit processing at his or her discretion whenever a facility or activity requires all permits either from EPA or from an approved State.

(2) The Regional Administrator and the State Director(s) may agree to consolidate draft permits whenever a facility or activity requires permits from both EPA and an approved State.

(3) Permit applicants may recommend whether or not the processing of their applications should be consolidated.

(d) Whenever permit processing is consolidated and the Regional Administrator invokes the "initial licensing" provisions of Subpart F for an NPDES, RCRA, or UIC permit, any permit(s) with which that NPDES, RCRA or UIC permit was consolidated shall likewise be processed under Subpart F.

(e) Except with the written consent of the permit applicant, the Regional Administrator shall not consolidate processing a PSD permit with any other permit under paragraph (a) or (b) of this section or process a PSD permit under Subpart F as provided in paragraph (d) of this section when to do so would delay issuance of the PSD permit more than one year from the effective date of the application under § 124.3(f).

§ 124.5 Modification, revocation and reissuance, or termination of permits.

(a) (*Applicable to State programs, see §§ 123.25 (NPDES), 145.11 (UIC), 233.26 (404), and 271.14 (RCRA)*). Permits (other than PSD permits) may be modified, revoked and reissued, or terminated either at the request of any interested person (including the permittee) or upon the Director's initiative. However, permits may only be modified, revoked and reissued, or terminated for the reasons specified in § 122.62 or § 122.64 (NPDES), 144.39 or 144.40 (UIC), 233.14 or 233.15 (404), and 270.41 or 270.43 (RCRA). All requests shall be in writing and shall contain facts or reasons supporting the request.

(b) If the Director decides the request is not justified, he or she shall send the requester a brief written response giving a reason for the decision. Denials of requests for modification, revocation and reissuance, or termination are not subject to public notice, comment, or hearings. Denials by the Regional Administrator may be informally appealed to the Administrator by a letter briefly setting forth the relevant facts. The Administrator may direct the Regional Administrator to begin modification, revocation and reissuance, or termination proceedings under paragraph (c) of this section. The appeal shall be considered denied if the Administrator takes no action on the letter within 60 days after receiving it. This informal appeal is, under 5 U.S.C. 704, a prerequisite to seeking judicial review of EPA action in denying a request for modification, revocation and reissuance, or termination.

(c) (*Applicable to State programs, see §§ 123.25 (NPDES, 145.11 (UIC), 233.2 (404), and 271.14 (RCRA)*). (1) If the Director tentatively decides to modify or revoke and reissue a permit under §§ 122.62 (NPDES), 144.39 (UIC 233.14 (404), or 270.41 or 270.42((RCRA), he or she shall prepare a draft permit under § 124.6 incorporating the proposed changes. The Director may request additional information and, in the case of a modified permit, may require the submission of an updated application. In the case of revoked and reissued permits, the Director shall require the submission of a new application.

(2) In a permit modification under this section, only those conditions to be modified shall be reopened when a new draft permit is prepared. All other aspects of the existing permit shall remain in effect for the duration of the unmodified permit. When a permit is revoked and reissued under this section, the entire permit is reopened just as if the permit had expired and was being reissued. During any revocation and reissuance proceeding the permittee shall comply with all conditions of

the existing permit until a new final permit is reissued.

(3) "Minor modifications" as defined in §§ 122.63 (NPDES), 144.41 (UIC), and 233.16 (404), and "Classes 1 and 2 modifications" as defined in § 270.42 (a) and (b) (RCRA) are not subject to the requirements of this section.

(d) (*Applicable to State programs, see §§ 123.25 (NPDES), 145.11 (UIC), 233.26 (404), and 271.14 (RCRA)*). If the Director tentatively decides to terminate a permit under §§ 122.64 (NDPES), 144.40 (UIC), 233.15 (404), or 270.43 (RCRA), he or she shall issue a notice of intent to terminate. A notice of intent to terminate is a type of draft permit which follows the same procedures as any draft permit prepared under § 124.6. In the case of EPA-issued permits, a notice of intent to terminate shall not be issued if the Regional Administrator and the permittee agree to termination in the course of transferring permit responsibility to an approved State under § 123.24(b)(1) (NPDES), 145.24(b)(1) UIC), 271.8(b)(6) (RCRA), or 501.14(b)(1) (Sludge).

(e) When EPA is the permitting auhority, all draft permits (including otices of intent to terminate) preared under this section shall be based n the administrative record as deined in § 124.9.

(f) (*Applicable to State programs, see 233.26 (404)*). Any request by the permittee for modification to an existing 404 permit (other than a request for a minor modification as defined in 233.16 (404)) shall be treated as a ermit application and shall be processed in accordance with all requirements of § 124.3.

(g)(1) (Reserved for PSD Modificaon Provisions).

(2) PSD permits may be terminated nly by rescission under § 52.21(w) or y automatic expiration under 52.21(r). Applications for rescission hall be precessed under § 52.21(w) nd are not subject to this part.

EDITORIAL NOTE: Information collection requirements in this § 124.5 have not been approved by the Office of Management and udget and are not effective, pending OMB proval.

[48 FR 14264, Apr. 1, 1983, as amended at 53 FR 37934, Sept. 28, 1988; 54 FR 18785, May 2, 1989]

§ 124.6 Draft permits.

(a) (*Applicable to State programs, see §§ 123.25 (NPDES), 145.11 (UIC), 233.26 (404), and 271.14 (RCRA).*) Once an application is complete, the Director shall tentatively decide whether to prepare a draft permit (except in the case of State section 404 permits for which no draft permit is required under § 233.39) or to deny the application.

(b) If the Director tentatively decides to deny the permit application, he or she shall issue a notice of intent to deny. A notice of intent to deny the permit application is a type of draft permit which follows the same procedures as any draft permit prepared under this section. See § 124.6(e). If the Director's final decision (§ 124.15) is that the tentative decision to deny the permit application was incorrect, he or she shall withdraw the notice of intent to deny and proceed to prepare a draft permit under paragraph (d) of this section.

(c) (*Applicable to State programs, see §§ 123.25 (NPDES) and 233.26 (404).*) If the Director tentatively decides to issue an NPDES or 404 general permit, he or she shall prepare a draft general permit under paragraph (d) of this section.

(d) (*Applicable to State programs, see §§ 123.25 (NPDES), 145.11 (UIC), 233.26 (404), and 271.14 (RCRA).*) If the Director decides to prepare a draft permit, he or she shall prepare a draft permit that contains the following information:

(1) All conditions under §§ 122.41 and 122.43 (NPDES), 144.51 and 144.42 (UIC, 233.7 and 233.8 (404, or 270.30 and 270.32 (RCRA) (except for PSD permits)));

(2) All compliance schedules under §§ 122.47 (NPDES), 144.53 (UIC), 233.10 (404), or 270.33 (RCRA) (except for PSD permits);

(3) All monitoring requirements under §§ 122.48 (NPDES), 144.54 (UIC), 233.11 (404), or 270.31 (RCRA) (except for PSD permits); and

(4) For:

(i) RCRA permits, standards for treatment, storage, and/or disposal and other permit conditions under § 270.30;

(ii) UIC permits, permit conditions under § 144.52;

(iii) PSD permits, permit conditions under 40 CFR § 52.21;

(iv) 404 permits, permit conditions under §§ 233.7 and 233.8;

(v) NPDES permits, effluent limitations, standards, prohibitions, standards for sewage sludge use or disposal, and conditions under §§ 122.41, 122.42, and 122.44, including when applicable any conditions certified by a State agency under § 124.55, and all variances that are to be included under § 124.63.

(e) (*Applicable to State programs, see §§ 123.25 (NPDES), 145.11 (UIC), 233.26 (404), and 271.14 (RCRA).*) All draft permits prepared by EPA under this section shall be accompanied by a statement of basis (§ 124.7) or fact sheet (§ 124.8), and shall be based on the administrative record (§ 124.9), publicly noticed (§ 124.10) and made available for public comment (§ 124.11). The Regional Administrator shall give notice of opportunity for a public hearing (§ 124.12), issue a final decision (§ 124.15) and respond to comments (§ 124.17). For RCRA, UIC or PSD permits, an appeal may be taken under § 124.19 and, for NPDES permits, an appeal may be taken under § 124.74. Draft permits prepared by a State shall be accompanied by a fact sheet if required under § 124.8.

[48 FR 14264, Apr. 1, 1983, as amended at 54 FR 18785, May 2, 1989]

§ 124.7 Statement of basis.

EPA shall prepare a statement of basis for every draft permit for which a fact sheet under § 124.8 is not prepared. The statement of basis shall briefly describe the derivation of the conditions of the draft permit and the reasons for them or, in the case of notices of intent to deny or terminate, reasons supporting the tentative decision. The statement of basis shall be sent to the applicant and, on request, to any other person.

§ 124.8 Fact sheet.

(*Applicable to State programs, §§ 123.25 (NPDES), 145.11 (UI 233.26 (404), and 271.14 (RCRA).*)

(a) A fact sheet shall be prepared every draft permit for a major HW UIC, 404, or NPDES facility or acti ty, for every Class I sludge manag ment facility, for every 404 a NPDES general permit (§§ 237.37 a 122.28), for every NPDES draft perm that incorporates a variance or quires an explanation und § 124.56(b), for every draft permit th includes a sewage sludge land applic tion plan under 40 CF 501.15(a)(2)(ix), and for every dra permit which the Director finds is t subject of wide-spread public inter or raises major issues. The fact she shall briefly set forth the princip facts and the significant factual, leg methodological and policy questio considered in preparing the dra permit. The Director shall send th fact sheet to the applicant and, on quest, to any other person.

(b) The fact sheet shall inclu when applicable:

(1) A brief description of the type facility or activity which is the subje of the draft permit;

(2) The type and quantity of waste fluids, or pollutants which are pr posed to be or are being treate stored, disposed of, injected, emitte or discharged.

(3) For a PSD permit, the degree increment consumption expected result from operation of the facility activity.

(4) A brief summary of the basis the draft permit conditions includi references to applicable statutory regulatory provisions and appropri supporting references to the admin trative record required by § 124.9 EPA-issued permits);

(5) Reasons why any requested iances or alternatives to requi standards do or do not appear jus fied;

(6) A description of the procedu for reaching a final decision on draft permit including:

(i) The beginning and ending da of the comment period under § 12 and the address where comments will be received;

(ii) Procedures for requesting a hearing and the nature of that hearing; and

(iii) Any other procedures by which the public may participate in the final decision.

(7) Name and telephone number of a person to contact for additional information.

(8) For NPDES permits, provisions satisfying the requirements of 124.56.

48 FR 14264, Apr. 1, 1983, as amended at 54 R 18786, May 2, 1989]

124.9 Administrative record for draft permits when EPA is the permitting authority.

(a) The provisions of a draft permit repared by EPA under § 124.6 shall e based on the administrative record efined in this section.

(b) For preparing a draft permit nder § 124.6, the record shall consist :

(1) The application, if required, and ny supporting data furnished by the pplicant;

(2) The draft permit or notice of tent to deny the application or to rminate the permit;

3) The statement of basis (§ 124.7) fact sheet (§ 124.8);

4) All documents cited in the statement of basis or fact sheet; and

5) Other documents contained in e supporting file for the draft rmit.

6) For NPDES new source draft perts only, any environmental assessnt, environmental impact statent (EIS), finding of no significant pact, or environmental information cument and any supplement to an S that may have been prepared. DES permits other than permits to sources as well as all RCRA, UIC d PSD permits are not subject to environmental impact statement visions of section 102(2)(C) of the tional Environmental Policy Act, 42 .C. 4321.

c) Material readily available at the ing Regional Office or published terial that is generally available, that is included in the administra- record under paragraphs (b) and (c) of this section, need not be physically included with the rest of the record as long as it is specifically referred to in the statement of basis or the fact sheet.

(d) This section applies to all draft permits when public notice was given after the effective date of these regulations.

§ 124.10 Public notice of permit actions and public comment period.

(a) *Scope.* (1) The Director shall give public notice that the following actions have occurred:

(i) A permit application has been tentatively denied under § 124.6(b);

(ii) (*Applicable to State programs, see §§ 123.25 (NPDES), 145.11 (UIC), 233.26 (404), and 271.14 (RCRA)*). A draft permit has been prepared under § 124.6(d);

(iii) (*Applicable to State programs, see §§ 123.25 (NPDES), 145.11 (UIC), 233.26 (404) and 271.14 (RCRA)*). A hearing has been scheduled under § 124.12, Subpart E or Subpart F;

(iv) An appeal has been granted under § 124.19(c);

(v) (*Applicable to State programs, see § 233.26 (404)*). A State section 404 application has been received in cases when no draft permit will be prepared (see § 233.39); or

(vi) An NPDES new source determination has been made under § 122.29.

(2) No public notice is required when a request for permit modification, revocation and reissuance, or termination is denied under § 124.5(b). Written notice of that denial shall be given to the requester and to the permittee.

(3) Public notices may describe more than one permit or permit actions.

(b) *Timing (applicable to State programs, see §§ 123.25 (NPDES), 145.11 (UIC), 233.26 (404, and 271.14 (RCRA)).* (1) Public notice of the preparation of a draft permit (including a notice of intent to deny a permit application) required under paragraph (a) of this section shall allow at least 30 days for public comment. For RCRA permits only, public notice shall allow at least 45 days for public comment. For EPA-issued permits, if the Regional Administrator determines under 40 CFR Part 6, Subpart F that an Environmental Impact Statement (EIS) shall be prepared for an NPDES new source, public notice of the draft permit shall not be given until after a draft EIS is issued.

(2) Public notice of a public hearing shall be given at least 30 days before the hearing. (Public notice of the hearing may be given at the same time as public notice of the draft permit and the two notices may be combined.)

(c) *Methods (applicable to State programs, see §§ 123.25 (NPDES), 145.11 (UIC), 233.26 (404), and 271.14 (RCRA)).* Public notice of activities described in paragraph (a)(1) of this section shall be given by the following methods:

(1) By mailing a copy of a notice to the following persons (any person otherwise entitled to receive notice under this paragraph may waive his or her rights to receive notice for any classes and categories of permits);

(i) The applicant (except for NPDES and 404 general permits when there is no applicant);

(ii) Any other agency which the Director knows has issued or is required to issue a RCRA, UIC, PSD (or other permit under the Clean Air Act), NPDES, 404, sludge management permit, or ocean dumping permit under the Marine Research Protection and Sanctuaries Act for the same facility or activity (including EPA when the draft permit is prepared by the State);

(iii) Federal and State agencies with jurisdiction over fish, shellfish, and wildlife resources and over coastal zone management plans, the Advisory Council on Historic Preservation, State Historic Preservation Officers, including any affected States (Indian Tribes). (For purposes of this paragraph, and in the context of the Underground Injection Control Program only, the term State includes Indian Tribes treated as States.)

(iv) For NPDES and 404 permits only, any State agency responsible for plan development under CWA section 208(b)(2), 208(b)(4) or 303(e) and the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service and the National Marine Fisheries Service;

(v) For NPDES permits only, any user identified in the permit application of a privately owned treatme works;

(vi) For 404 permits only, any re sonably ascertainable owner of prope ty adjacent to the regulated facility o activity and the Regional Director o the Federal Aviation Administration i the discharge involves the constru tion of structures which may affe aircraft operations or for purposes a sociated with seaplane operations;

(vii) For PSD permits only, affecte State and local air pollution contr agencies, the chief executives of th city and county where the major st tionary source or major modificati would be located, any comprehensi regional land use planning agency an any State, Federal Land Manager, o Indian Governing Body whose lan may be affected by emissions from th regulated activity;

(viii) For Class I injection well UI permits only, state and local oil an gas regulatory agencies and sta agencies regulating mineral explor tion and recovery;

(ix) Persons on a mailing list deve oped by:

(A) Including those who request i writing to be on the list;

(B) Soliciting persons for "area lists from participants in past permit pro ceedings in that area; and

(C) Notifying the public of the op portunity to be put on the mailing li through periodic publication in th public press and in such publicatio as Regional and State funded newsle ters, environmental bulletins, or Sta law journals. (The Director ma update the mailing list from time t time by requesting written indicati of continued interest from tho listed. The Director may delete fro the list the name of any person wh fails to respond to such a request.)

(x)(A) To any unit of local gover ment having jurisdiction over the ar where the facility is proposed to be l cated; and (B) to each State agen having any authority under State la with respect to the construction or o eration of such facility.

(2)(i) For major permits, NPD and 404 general permits, and perm that include sewage sludge land app cation plans under 40 C 501.15(a)(2)(ix), publication of a not in a daily or weekly newspaper within the area affected by the facility or activity; and for EPA-issued NPDES general permits, in the FEDERAL REGISTER;

NOTE: The Director is encouraged to provide as much notice as possible of the NPDES or Section 404 draft general permit to the facilities or activities to be covered by the general permit.

(ii) For all RCRA permits, publication of a notice in a daily or weekly major local newspaper of general circulation and broadcast over local radio stations.

(3) When the program is being administered by an approved State, in a manner constituting legal notice to the public under State law; *and*

(4) Any other method reasonably calculated to give actual notice of the action in question to the persons potentially affected by it, including press releases or any other forum or medium to elicit public participation.

(d) *Contents (applicable to State programs, see §§ 123.25 (NPDES), 145.11 (UIC), 233.26 (404), and 271.14 (RCRA))*—(1) *All public notices.* All public notices issued under this part shall contain the following minimum information:

(i) Name and address of the office processing the permit action for which notice is being given;

(ii) Name and address of the permittee or permit applicant and, if different, of the facility or activity regulated by the permit, except in the case of NPDES and 404 draft general permits under §§ 122.28 and 233.37;

(iii) a brief description of the business conducted at the facility or activity described in the permit application or the draft permit, for NPDES or 404 general permits when there is no application.

(iv) Name, address and telephone number of a person from whom interested persons may obtain further information, including copies of the draft permit or draft general permit, as the case may be, statement of basis or fact sheet, and the application; and

(v) A brief description of the comment procedures required by §§ 124.11 and 124.12 and the time and place of any hearing that will be held, including a statement of procedures to request a hearing (unless a hearing has already been scheduled) and other procedures by which the public may participate in the final permit decision.

(vi) For EPA-issued permits, the location of the administrative record required by § 124.9, the times at which the record will be open for public inspection, and a statement that all data submitted by the applicant is available as part of the administrative record.

(vii) For NPDES permits only (including those for "sludge-only facilities"), a general description of the location of each existing or proposed discharge point and the name of the receiving water and the sludge use and disposal practice(s) and the location of each sludge treatment works treating domestic sewage and use or disposal sites known at the time of permit application. For draft general permits, this requirement will be satisfied by a map or description of the permit area. For draft general permits, this requirement will be satisfied by a map or description of the permit area. For EPA-issued NPDES permits only, if the discharge is from a new source, a statement as to whether an environmental impact statement will be or has been prepared.

(viii) For 404 permits only,

(A) The purpose of the proposed activity (including, in the case of fill material, activities intended to be conducted on the fill), a description of the type, composition, and quantity of materials to be discharged and means of conveyance; and any proposed conditions and limitations on the discharge;

(B) The name and water quality standards classification, if applicable, of the receiving waters into which the discharge is proposed, and a general discription of the site of each proposed discharge and the portions of the site and the discharges which are within State regulated waters;

(C) A description of the anticipated environmental effects of activities conducted under the permit;

(D) References to applicable statutory or regulatory authority; and

(E) Any other available information which may assist the public in evaluating the likely impact of the proposed activity upon the integrity of the receiving water.

(ix) Any additional information considered necessary or proper.

(2) *Public notices for hearings.* In addition to the general public notice described in paragraph (d)(1) of this section, the public notice of a hearing under § 124.12, Subpart E, or Subpart F shall contain the following information:

(i) Reference to the date of previous public notices relating to the permit;

(ii) Date, time, and place of the hearing;

(iii) A brief description of the nature and purpose of the hearing, including the applicable rules and procedures; and

(iv) For 404 permits only, a summary of major issues raised to date during the public comment period.

(e) (*Applicable to State programs, see §§ 123.25 (NPDES), 145.11 (UIC), 233.26 (404), and 271.14 (RCRA)*). In addition to the general public notice described in paragraph (d)(1) of this section, all persons identified in paragraphs (c)(1) (i), (ii), (iii), and (iv) of this section shall be mailed a copy of the fact sheet or statement of basis (for EPA-issued permits), the permit application (if any) and the draft permit (if any).

[48 FR 14264, Apr. 1, 1983; 48 FR 30115, June 30, 1983, as amended at 53 FR 28147, July 26, 1988; 53 FR 37410, Sept. 26, 1988; 54 FR 258, Jan. 4, 1989; 54 FR 18786, May 2, 1989]

§ 124.11 Public comments and requests for public hearings.

(*Applicable to State programs, see §§ 123.25 (NPDES), 145.11 (UIC), 233.26 (404), and 271.14 (RCRA).*) During the public comment period provided under § 124.10, any interested person may submit written comments on the draft permit or the permit application for 404 permits when no draft permit is required (see § 233.39) and may request a public hearing, if no hearing has already been scheduled. A request for a public hearing shall be in writing and shall state the nature of the issues proposed to be raised in the hearing. All comments shall be considered in making the final decision and shall be answered as provided in § 124.17.

§ 124.12 Public hearings.

(a) (*Applicable to State programs, see §§ 123.25 (NPDES), 145.11 (UIC), 233.26 (404), and 271.14 (RCRA).*) (1) The Director shall hold a public hearing whenever he or she finds, on the basis of requests, a significant degree of public interest in a draft permit(s);

(2) The Director may also hold a public hearing at his or her discretion, whenever, for instance, such a hearing might clarify one or more issues involved in the permit decision;

(3) For RCRA permits only, (i) the Director shall hold a public hearing whenever he or she receives written notice of opposition to a draft permit and a request for a hearing within 45 days of public notice under § 124.10(b)(1); (ii) whenever possible the Director shall schedule a hearing under this section at a location convenient to the nearest population center to the proposed facility;

(4) Public notice of the hearing shall be given as specified in § 124.10.

(b) Whenever a public hearing will be held and EPA is the permitting authority, the Regional Administrator shall designate a Presiding Officer for the hearing who shall be responsible for its scheduling and orderly conduct.

(c) Any person may submit oral or written statements and data concerning the draft permit. Reasonable limits may be set upon the time allowed for oral statements, and the submission of statements in writing may be required. The public comment period under § 124.10 shall automatically be extended to the close of any public hearing under this section. The hearing officer may also extend the comment period by so stating at the hearing.

(d) A tape recording or written transcript of the hearing shall be made available to the public.

(e)(1) At his or her discretion, the Regional Administrator may specify that RCRA or UIC permits be processed under the procedures in Subpart F.

(2) For initial RCRA permits for existing HWM facilities, the Regional Administrator shall have the discretion to provide a hearing under the procedures in Subpart F. The permit

pplicant may request such a hearing
ursuant to § 124.114 no one or more
sues, if the applicant explains in his
quest why he or she believes those
sues:

(i) Are genuine issues to material
ct; and (ii) determine the outcome of
e or more contested permit condi-
ns identified as such in the appli-
nt's request, that would require ex-
nsive changes to the facility ("con-
sted major permit conditions"). If
e Regional Administrator decides to
ny the request, he or she shall send
the applicant a brief written state-
ent of his or her reasons for conclud-
that no such determinative issues
ve been presented for resolution in
ch a hearing.

FR 14264, Apr. 1, 1983, as amended at 49
17718, Apr. 24, 1984; 50 FR 6941, Feb. 19,
5; 54 FR 258, Jan. 4, 1989]

24.13 Obligation to raise issues and provide information during the public comment period.

ll persons, including applicants,
o believe any condition of a draft
mit is inappropriate or that the Di-
tor's tentative decision to deny an
plication, terminate a permit, or
pare a draft permit is inappropri-
, must raise all reasonably ascer-
nable issues and submit all reason-
y available arguments supporting
ir position by the close of the
lic comment period (including any
lic hearing) under § 124.10. Any
porting materials which are sub-
ted shall be included in full and
y not be incorporated by reference,
ess they are already part of the ad-
istrative record in the same pro-
ding, or consist of State or Federal
tutes and regulations, EPA docu-
nts of general applicability, or
er generally available reference
terials. Commenters shall make
porting materials not already in-
ded in the administrative record
ilable to EPA as directed by the
gional Administrator. (A comment
iod longer than 30 days may be
essary to give commenters a rea-
able opportunity to comply with
requirements of this section. Addi-
al time shall be granted under
24.10 to the extent that a commenter who requests additional time demonstrates the need for such time.)

[49 FR 38051, Sept. 26, 1984]

§ 124.14 Reopening of the public comment period.

(a)(1) The Regional Administrator may order the public comment period reopened if the procedures of this paragraph could expedite the decisionmaking process. When the public comment period is reopened under this paragraph, all persons, including applicants, who believe any condition of a draft permit is inappropriate or that the Regional Administrator's tentative decision to deny an application, terminate a permit, or prepare a draft permit is inappropriate, must submit all reasonably available factual grounds supporting their position, including all supporting material, by a date, not less than sixty days after public notice under paragraph (a)(2) of this section, set by the Regional Administrator. Thereafter, any person may file a written response to the material filed by any other person, by a date, not less than twenty days after the date set for filing of the material, set by the Regional Administrator.

(2) Public notice of any comment period under this paragraph shall identify the issues to which the requirements of § 124.14(a) shall apply.

(3) On his own motion or on the request of any person, the Regional Administrator may direct that the requirements of paragraph (a)(1) of this section shall apply during the initial comment period where it reasonably appears that issuance of the permit will be contested and that applying the requirements of paragraph (a)(1) of this section will substantially expedite the decisionmaking process. The notice of the draft permit shall state whenever this has been done.

(4) A comment period of longer than 60 days will often be necessary in complicated proceedings to give commenters a reasonable opportunity to comply with the requirements of this section. Commenters may request longer comment periods and they shall be granted under § 124.10 to the extent they appear necessary.

(b) If any data information or arguments submitted during the public comment period, including information or arguments required under § 124.13, appear to raise substantial new questions concerning a permit, the Regional Administrator may take one or more of the following actions:

(1) Prepare a new draft permit, appropriately modified, under § 124.6;

(2) Prepare a revised statement of basis under § 124.7, a fact sheet or revised fact sheet under § 124.8 and reopen the comment period under § 124.14; or

(3) Reopen or extend the comment period under § 124.10 to give interested persons an opportunity to comment on the information or arguments submitted.

(c) Comments filed during the reopened comment period shall be limited to the substantial new questions that caused its reopening. The public notice under § 124.10 shall define the scope of the reopening.

(d) For RCRA, UIC, or NPDES permits, the Regional Administrator may also, in the circumstances described above, elect to hold further proceedings under Subpart F. This decision may be combined with any of the actions enumerated in paragraph (b) of this section.

(e) Public notice of any of the above actions shall be issued under § 124.10.

[48 FR 14264, Apr. 1, 1983, as amended at 49 FR 38051, Sept. 26, 1984]

§ 124.15 Issuance and effective date of permit.

(a) After the close of the public comment period under § 124.10 on a draft permit, the Regional Administrator shall issue a final permit decision (or a decision to deny a permit for the active life of a RCRA hazardous waste management facility or unit under § 270.29). The Regional Administrator shall notify the applicant and each person who has submitted written comments or requested notice of the final permit decision. This notice shall include reference to the procedures for appealing a decision on a RCRA, UIC, or PSD permit or for contesting a decision on an NPDES permit or a decision to terminate a RCRA permit. For the purposes of this section, a final permit decision means a final decision to issue, deny, modify, revoke and reissue, or terminate a permit.

(b) A final permit decision (or a decision to deny a permit for the active life of a RCRA hazardous waste management facility or unit under § 270.29) shall become effective 3 days after the service of notice of the decision unless:

(1) A later effective date is specified in the decision; or

(2) Review is requested under § 124.19 (RCRA, UIC, and PSD permits) or an evidentiary hearing is requested under § 124.74 (NPDES permit and RCRA permit terminations); or

(3) No comments requested a change in the draft permit, in which case the permit shall become effective immediately upon issuance.

[48 FR 14264, Apr. 1, 1983, as amended at 5 FR 9607, Mar. 7, 1989]

§ 124.16 Stays of contested permit conditions.

(a) *Stays.* (1) If a request for review of a RCRA or UIC permit under § 124.19 or an NPDES permit under § 124.74 or § 124.114 is granted or t conditions of a RCRA or UIC permit are consolidated for reconsideration i an evidentiary hearing on an NPDES permit under §§ 124.74, 124.82 124.114, the effect of the contested permit conditions shall be stayed and shall not be subject to judicial review pending final agency action. (No stay of a PSD permit is available under this section.) If the permit involves a new facility or new injection well, new source, new discharger or a recommencing discharger, the applicant shall be without a permit for the proposed new facility, injection well source or discharger pending final agency action. See also § 124.60.

(2) Uncontested conditions which are not serverable from those contested shall be stayed together with the contested conditions. Stayed provisions of permits for existing facilities injection wells, and sources shall b identified by the Regional Administrator. All other provisions of the permit for the existing facility, injection well or source shall remain fully effective and enforceable.

(b) *Stays based on cross effects.* (1) A stay may be granted based on the grounds that an appeal to the Administrator under § 124.19 of one permit may result in changes to another EPA-issued permit only when each of the permits involved has been appealed to the Administrator and he or she has accepted each appeal.

(2) No stay of an EPA-issued RCRA, UIC, or NPDES permit shall be granted based on the staying of any State-issued permit except at the discretion of the Regional Administrator and only upon written request from the State Director.

(c) Any facility or activity holding an existing permit must:

(1) Comply with the conditions of hat permit during any modification r revocation and reissuance proceedng under § 124.5; and

(2) To the extent conditions of any ew permit are stayed under this secion, comply with the conditions of he existing permit which correspond o the stayed conditions, unless comliance with the existing conditions ould be technologically incompatible ith compliance with other conditions f the new permit which have not een stayed.

124.17 Response to comments.

(a) (*Applicable to State programs, see 123.25 (NPDES), 145.11 (UIC), 33.26 (404), and 271.14 (RCRA).*) At e time that any final permit decision issued under § 124.15, the Director all issue a response to comments. ates are only required to issue a reonse to comments when a final rmit is issued. This response shall:

1) Specify which provisions, if any, the draft permit have been changed the final permit decision, and the asons for the change; and

2) Briefly describe and respond to significant comments on the draft rmit or the permit application (for tion 404 permits only) raised during e public comment period, or during y hearing.

b) For EPA-issued permits, any docents cited in the response to comnts shall be included in the adminative record for the final permit deion as defined in § 124.18. If new nts are raised or new material supplied during the public comment period, EPA may document its response to those matters by adding new materials to the administrative record.

(c) (*Applicable to State programs, see §§ 123.25 (NPDES), 145.11 (UIC), 233.26 (404), and 271.14 (RCRA).*) The response to comments shall be available to the public.

§ 124.18 Administrative record for final permit when EPA is the permitting authority.

(a) The Regional Administrator shall base final permit decisions under § 124.15 on the administrative record defined in this section.

(b) The administrative record for any final permit shall consist of the administrative record for the draft permit and:

(1) All comments received during the public comment period provided under § 124.10 (including any extension or reopening under § 124.14);

(2) The tape or transcript of any hearing(s) held under § 124.12;

(3) Any written materials submitted at such a hearing;

(4) The response to comments required by § 124.17 and any new material placed in the record under that section;

(5) For NPDES new source permits only, final environmental impact statement and any supplement to the final EIS;

(6) Other documents contained in the supporting file for the permit; and

(7) The final permit.

(c) The additional documents required under paragraph (b) of this section should be added to the record as soon as possible after their receipt or publication by the Agency. The record shall be complete on the date the final permit is issued.

(d) This section applies to all final RCRA, UIC, PSD, and NPDES permits when the draft permit was subject to the administrative record requirements of § 124.9 and to all NPDES permits when the draft permit was included in a public notice after October 12, 1979.

(e) Material readily available at the issuing Regional Office, or published materials which are generally available and which are included in the administrative record under the standards of this section or of § 124.17 ("Response to comments"), need not be physically included in the same file as the rest of the record as long as it is specifically referred to in the statement of basis or fact sheet or in the response to comments.

§ 124.19 Appeal of RCRA, UIC, and PSD permits.

(a) Within 30 days after a RCRA, UIC, or PSD final permit decision (or a decision under § 270.29 to deny a permit for the active life of a RCRA hazardous waste management facility or unit) has been issued under § 124.15, any person who filed comments on that draft permit or participated in the public hearing may petition the Administrator to review any condition of the permit decision. Any person who failed to file comments or failed to participate in the public hearing on the draft permit may petition for administrative review only to the extent of the changes from the draft to the final permit decision. The 30-day period within which a person may request review under this section begins with the service of notice of the Regional Administrator's action unless a later date is specified in that notice. The petition shall include a statement of the reasons supporting that review, including a demonstration that any issues being raised were raised during the public comment period (including any public hearing) to the extent required by these regulations and when appropriate, a showing that the condition in question is based on:

(1) A finding of fact or conclusion of law which is clearly erroneous, or

(2) An exercise of discretion or an important policy consideration which the Administrator should, in his or her discretion, review.

(b) The Administrator may also decide on his or her initiative to review any condition of any RCRA, UIC, or PSD permit issued under this part. The Administrator must act under this paragraph within 30 days of the service date of notice of the Regional Administrator's action.

(c) Within a reasonable time following the filing of the petition for
review, the Administrator shall
an order either granting or de
the petition for review. To the e
review is denied, the conditions o
final permit decision become
agency action. Public notice of
grant of review by the Administ
under paragraph (a) or (b) of thi
tion shall be given as provide
§ 124.10. Public notice shall set fo
briefing schedule for the appea
shall state that any interested p
may file an amicus brief. Noti
denial of review shall be sent or
the person(s) requesting review.

(d) The Administrator may
consideration of an appeal of a R
or UIC permit under this section
the completion of formal procee
under Subpart E or F relating
NPDES permit issued to the sam
cility or activity upon concluding

(1) The NPDES permit is like
raise issues relevant to a decisi
the RCRA or UIC appeals;

(2) The NPDES permit is likely
appealed; and

(3) *Either:* (i) The interests of
the facility or activity and the p
are not likely to be materially ad
ly affected by the deferral; or

(ii) Any adverse effect is outwe
by the benefits likely to result fr
consolidated decision on appeal.

(e) A petition to the Administ
under paragraph (a) of this secti
under 5 U.S.C. 704, a prerequisi
the seeking of judicial review o
final agency action.

(f)(1) For purposes of judicial r
under the appropriate Act,
agency action occurs when a
RCRA, UIC, or PSD permit is i
or denied by EPA and agency r
procedures are exhausted. A
permit decision shall be issued b
Regional Administrator:

(i) When the Administrator
notice to the parties that revie
been denied; (ii) when the Admin
tor issues a decision on the mer
the appeal and the decision doe
include a remand of the procee
or (iii) upon the completion of re
proceedings if the proceedings a
manded, unless the Administr
remand order specifically pro
that appeal of the remand de

will be required to exhaust administrative remedies.

(2) Notice of any final agency action regarding a PSD permit shall promptly be published in the FEDERAL REGISTER.

[48 FR 14264, Apr. 1, 1983, as amended at 54 FR 9607, Mar. 7, 1989]

§ 124.20 Computation of time.

(a) Any time period scheduled to begin on the occurrence of an act or event shall begin on the day after the act or event.

(b) Any time period scheduled to begin before the occurrence of an act or event shall be computed so that the period ends on the day before the act or event.

(c) If the final day of any time period falls on a weekend or legal holiday, the time period shall be extended to the next working day.

(d) Whenever a party or interested person has the right or is required to act within a prescribed period after the service of notice or other paper upon him or her by mail, 3 days shall be added to the prescribed time.

§ 124.21 Effective date of Part 124.

(a) Except for paragraphs (b) and (c) of this section, Part 124 will become effective July 18, 1980. Because this effective date will precede the processing of any RCRA or UIC permits, Part 124 will apply in its entirety to all RCRA and UIC permits.

(b) All provisions of Part 124 pertaining to the RCRA program will become effective on November 19, 1980.

(c) All provisions of Part 124 pertaining to the UIC program will become effective July 18, 1980, but shall not be implemented until the effective date of 40 CFR Part 146.

(d) This part does not significantly change the way in which NPDES permits are processed. Since October 12, 1979, NPDES permits have been the subject to almost identical requirements in the revised NPDES regulations which were promulgated on June 7, 1979. See *44 FR 32948*. To the extent this part changes the revised NPDES permit regulations, those changes will take effect as to all permit proceedings in progress on July 3, 1980.

(e) This part also does not significantly change the way in which PSD permits are processed. For the most part, these regulations will also apply to PSD proceedings in progress on July 18, 1980. However, because it would be disruptive to require retroactively a formal administrative record for PSD permits issued without one, §§ 124.9 and 124.18 will apply to PSD permits for which draft permits were prepared after the effective date of these regulations.

Subpart B—Specific Procedures Applicable to RCRA Permits [Reserved]

Subpart C—Specific Procedures Applicable to PSD Permits

§ 124.41 Definitions applicable to PSD permits.

Whenever PSD permits are processed under this part, the following terms shall have the following meanings:

"Administrator," "EPA," and "Regional Administrator" shall have the meanings set forth in § 124.2, except when EPA has delegated authority to administer those regulations to another agency under the applicable subsection of 40 CFR 52.21, the term "EPA" shall mean the delegate agency and the term "Regional Administrator" shall mean the chief administrative officer of the delegate agency.

"Application" means an application for a PSD permit.

"Appropriate Act and Regulations" means the Clean Air Act and applicable regulations promulgated under it.

"Approved program" means a State implementation plan providing for issuance of PSD permits which has been approved by EPA under the Clean Air Act and 40 CFR Part 51. An "approved State" is one administering an "approved program." "State Director" as used in § 124.4 means the person(s) responsible for issuing PSD permits under an approved program, or that person's delegated representative.

"Construction" has the meaning given in 40 CFR 52.21.

"Director" means the Regional Administrator.

"Draft permit" shall have the meaning set forth in § 124.2.

"Facility or activity" means a "major PSD stationary source" or "major PSD modification."

"Federal Land Manager" has the meaning given in 40 CFR 52.21.

"Indian Governing Body" has the meaning given in 40 CFR 52.21.

"Major PSD modification" means a "major modification" as defined in 40 CFR 52.21.

"Major PSD stationary source" means a "major stationary source" as defined in 40 CFR 52.21(b)(1).

"Owner or operator" means the owner or operator of any facility or activity subject to regulation under 40 CFR 52.21 or by an approved State.

"Permit" or "PSD permit" means a permit issued under 40 CFR 52.21 or by an approved State.

"Person" includes an individual, corporation, partnership, association, State, municipality, political subdivision of a State, and any agency, department, or instrumentality of the United States and any officer, agent or employee thereof.

"Regulated activity" or "activity subject to regulation" means a "major PSD stationary source" or "major PSD modification."

"Site" means the land or water area upon which a "major PSD stationary source" or "major PSD modification" is physically located or conducted, including but not limited to adjacent land used for utility systems; as repair, storage, shipping or processing areas; or otherwise in connection with the "major PSD stationary source" or "major PSD modification."

"State" means a State, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, and American Samoa and includes the Commonwealth of the Northern Mariana Islands.

§ 124.42 Additional procedures for PSD permits affecting Class I areas.

(a) The Regional Administrator shall provide notice of any permit application for a proposed major PSD stationary source or major PSD modification the emissions from which
would affect a Class I area to the F
eral Land Manager, and the Fede
official charged with direct respon
bility for management of any la
within such area. The Regional
ministrator shall provide such not
promptly after receiving the appli
tion.

(b) Any demonstration which
Federal Land Manager wishes
present under 40 CFR 52.21(q)(3), a
any variances sought by an owner
operator under § 52.21(q)(4) shall
submitted in writing, together w
any necessary supporting analysis,
the end of the public comment per
under § 124.10 or § 124.118. (40 C
52.21(q)(3) provides for denial of
PSD permit to a facility or activ
when the Federal Land Manager de
onstrates that its emissions would
versely affect a Class I area ev
though the applicable incremen
would not be exceeded. 40 C
52.21(q)(4) conversely authorizes EP
with the concurrence of the Fede
Land Manager and State responsib
to grant certain variances from
otherwise applicable emission limi
tions to a facility or activity wh
emissions would affect a Class I are

(c) Variances authorized by 40 C
52.21 (q)(5) through (q)(7) shall
handled as specified in those pa
graphs and shall not be subject to t
part. Upon receiving appropriate do
mentation of a variance prope
granted under any of these provisio
the Regional Administrator sh
enter the variance in the administ
tive record. Any decisions later ma
in proceedings under this part c
cerning that permit shall be consiste
with the conditions of that variance.

Subpart D—Specific Procedures Applicable to NPDES Permits

§ 124.51 Purpose and scope.

(a) This subpart sets forth additio
al requirements and procedures for
cisionmaking for the NPDES progra

(b) Decisions on NPDES variance
quests ordinarily will be made duri
the permit issuance process. Varian
and other changes in permit con
tions ordinarily will be decid
through the same notice-and-comme

and hearing procedures as the basic permit.

§ 124.52 Permits required on a case-by-case basis.

(a) Various sections of Part 122, Subpart B allow the Director to determine, on a case-by-case basis, that certain concentrated animal feeding operations (§ 122.23), concentrated aquatic animal production facilities (§ 122.24), separate storm sewers (§ 122.26), and certain other facilities covered by general permits (§ 122.28) that do not generally require an individual permit may be required to obtain an individual permit because of their contributions to water pollution.

(b) Whenever the Regional Administrator decides that an individual permit is required under this section, the Regional Administrator shall notify the discharger in writing of that decision and the reasons for it, and shall send an application form with the notice. The discharger must apply for a permit under § 122.21 within 60 days of notice. The question whether the initial designation was proper will remain open for consideration during the public comment period under § 124.11 or § 124.118 and in any subsequent hearing.

§ 124.53 State certification.

(a) Under CWA section 401(a)(1), EPA may not issue a permit until a certification is granted or waived in accordance with that section by the State in which the discharge originates or will originate.

(b) Applications received without a State certification shall be forwarded by the Regional Administrator to the certifying State agency with a request that certification be granted or denied.

(c) If State certification has not been received by the time the draft permit is prepared, the Regional Administrator shall send the certifying State agency:

(1) A copy of a draft permit;

(2) A statement that EPA cannot issue or deny the permit until the certifying State agency has granted or denied certification under § 124.55, or waived its right to certify; and

(3) A statement that the State will be deemed to have waived its right to certify unless that right is exercised within a specified reasonable time not to exceed 60 days from the date the draft permit is mailed to the certifying State agency unless the Regional Administrator finds that unusual circumstances require a longer time.

(d) State certification shall be granted or denied within the reasonable time specified under paragraph (c)(3) of this section. The State shall send a notice of its action, including a copy of any certification, to the applicant and the Regional Administrator.

(e) State certification shall be in writing and shall include:

(1) Conditions which are necessary to assure compliance with the applicable provisions of CWA sections 208(e), 301, 302, 303, 306, and 307 and with appropriate requirements of State law;

(2) When the State certifies a draft permit instead of a permit application, any conditions more stringent than those in the draft permit which the State finds necessary to meet the requirements listed in paragraph (e)(1) of this section. For each more stringent condition, the certifying State agency shall cite the CWA or State law references upon which that condition is based. Failure to provide such a citation waives the right to certify with respect to that condition; and

(3) A statement of the extent to which each condition of the draft permit can be made less stringent without violating the requirements of State law, including water quality standards. Failure to provide this statement for any condition waives the right to certify or object to any less stringent condition which may be established during the EPA permit issuance process.

§ 124.54 Special provisions for State certification and concurrence on applications for section 301(h) variances.

(a) When an application for a permit incorporating a variance request under CWA section 301(h) is submitted to a State, the appropriate State official shall either:

(1) Deny the request for the CWA section 301(h) variance (and so notify the applicant and EPA) and, if the State is an approved NPDES State

and the permit is due for reissuance, process the permit application under normal procedures; or

(2) Forward a certification meeting the requirements of § 124.53 to the Regional Administrator.

(b) When EPA issues a tentative decision on the request for a variance under CWA section 301(h), and no certification has been received under paragraph (a) of this section, the Regional Administrator shall forward the tentative decision to the State in accordance with § 124.53(b) specifying a reasonable time for State certification and concurrence. If the State fails to deny or grant certification and concurrence under paragraph (a) of this section within such reasonable time, certification shall be waived and the State shall be deemed to have concurred in the issuance of a CWA section 301(h) variance.

(c) Any certification provided by a State under paragraph (a)(2) of this section shall constitute the State's concurrence (as required by section 301(h)) in the issuance of the permit incorporating a section 301(h) variance subject to any conditions specified therein by the State. CWA section 301(h) certification and concurrence under this section will not be forwarded to the State by EPA for recertification after the permit issuance process; States must specify any conditions required by State law, including water quality standards, in the initial certification.

§ 124.55 Effect of State certification.

(a) When certification is required under CWA section 401(a)(1) no final permit shall be issued:

(1) If certification is denied, or

(2) Unless the final permit incorporates the requirements specified in the certification under § 124.53(d)(1) and (2).

(b) If there is a change in the State law or regulation upon which a certification is based, or if a court of competent jurisdiction or appropriate State board or agency stays, vacates, or remands a certification, a State which has issued a certification under § 124.53 may issue a modified certification or notice of waiver and forward it to EPA. If the modified certification is received before final agency action on the permit, the permit shall be consistent with the more stringent conditions which are based upon State law identified in such certification. If the certification or notice of waiver is received after final agency action on the permit, the Regional Administrator may modify the permit on request of the permittee only to the extent necessary to delete any conditions based on a condition in a certification invalidated by a court of competent jurisdiction or by an appropriate State board or agency.

(c) A State may not condition or deny a certification on the grounds that State law allows a less stringent permit condition. The Regional Administrator shall disregard any such certification conditions, and shall consider those conditions or denials as waivers of certification.

(d) A condition in a draft permit may be changed during agency review in any manner consistent with a certification meeting the requirements of § 124.53(d). No such changes shall require EPA to submit the permit to the State for recertification.

(e) Review and appeals of limitations and conditions attributable to State certification shall be made through the applicable procedures of the State and may not be made through the procedures in this part.

(f) Nothing in this section shall affect EPA's obligation to comply with § 122.47. See CWA section 301(b)(1)(C).

§ 124.56 Fact sheets.

(*Applicable to State programs, see § 123.25 (NPDES).*) In addition to meeting the requirements of § 124.8, NPDES fact sheets shall contain the following:

(a) Any calculations or other necessary explanation of the derivation of specific effluent limitations and conditions or standards for sewage sludge use or disposal, including a citation to the applicable effluent limitation guideline, performance standard, or standard for sewage sludge use or disposal as required by § 122.44 and reasons why they are applicable or an ex-

planation of how the alternate efflu-
nt limitations were developed.
(b)(1) When the draft permit con-
ains any of the following conditions,
n explanation of the reasons why
uch conditions are applicable:
(i) Limitations to control toxic pol-
tants under § 122.44(e);
(ii) Limitations on internal waste
reams under § 122.45(i); or
(iii) Limitations on indicator pollut-
nts under §125.3(g).
(iv) Limitations set on a case-by-case
sis under § 125.3 (c)(2) or (c)(3), or
rsuant to Section 405(d)(4) of the
WA.
(2) For every permit to be issued to a
eatment works owned by a person
her than a State or municipality, an
planation of the Director's decision
regulation of users under
22.44(m).
c) When appropriate, a sketch or
tailed description of the location of
e discharge or regulated activity de-
ibed in the application; and
d) For EPA-issued NPDES permits,
e requirements of any State certifi-
ion under § 124.53.
e) For permits that include a
age sludge land application plan
der 40 CFR 501.15(a)(2)(ix), a brief
cription of how each of the re-
red elements of the land applica-
n plan are addressed in the permit.

FR 14264, Apr. 1, 1983, as amended at 49
33051, Sept. 26, 1984; 54 FR 18786, May
989]

4.57 Public notice.

) *Section 316(a) requests (applica-*
to State programs, see § 123.25). In
ition to the information required
ler § 124.10(d)(1), public notice of
NPDES draft permit for a dis-
rge where a CWA section 316(a) re-
st has been filed under § 122.21(l)
ll include:
) A statement that the thermal
ponent of the discharge is subject
ffluent limitations under CWA sec-
301 or 306 and a brief description,
uding a quantitative statement, of
thermal effluent limitations pro-
ed under section 301 or 306;
) A statement that a section 316(a)
est has been filed and that alter-
ve less stringent effluent limita-
s may be imposed on the thermal
component of the discharge under section 316(a) and a brief description, including a quantitative statement, of the alternative effluent limitations, if any, included in the request; and

(3) If the applicant has filed an early screening request under § 125.72 for a section 316(a) variance, a statement that the applicant has submitted such a plan.

(b) *Evidentiary hearings under Subpart E.* In addition to the information required under § 124.10(d)(2), public notice of a hearing under Subpart E shall include:

(1) Reference to any public hearing under § 124.12 on the disputed permit;

(2) Name and address of the person(s) requesting the evidentiary hearing;

(3) A statement of the following procedures:

(i) Any person seeking to be a party must file a request to be admitted as a party to the hearing within 15 days of the date of publication of the notice;

(ii) Any person seeking to be a party may, subject to the requirements of § 124.76, propose material issues of fact or law not already raised by the original requester or another party;

(iii) The conditions of the permit(s) at issue may be amended after the evidentiary hearing and any person interested in those permit(s) must request to be a party in order to preserve any right to appeal or otherwise contest the final administative decision.

(c) *Non-adversary panel procedures under Subpart F.* (1) In addition to the information required under § 124.10(d)(2), mailed public notice of a draft permit to be processed under Subpart F shall include a statement that any hearing shall be held under Subpart F (panel hearing).

(2) Mailed public notice of a panel hearing under Subpart F shall include:

(i) Name and address of the person requesting the hearing, or a statement that the hearing is being held by order of the Regional Administrator, and the name and address of each known party to the hearing;

(ii) A statement whether the recommended decision will be issued by the Presiding Officer or by the Regional Administrator;

(iii) The due date for filing a written request to participate in the hearing under § 124.117; and

(iv) The due date for filing comments under § 124.118.

[48 FR 14264, Apr. 1, 1983; 50 FR 6941, Feb. 19, 1985]

§ 124.58 Special procedures for EPA-issued general permits for point sources other than separate storm sewers.

(a) The Regional Administrator shall send a copy of the draft general permit and the administrative record to the Deputy Assistant Administrator for Water Enforcement during the public comment period.

(b) The Deputy Assistant Administrator for Water Enforcement shall have 30 days from receipt of the draft general permit, or shall have until the end of the public comment period, whichever is later, to comment upon, object to, or make recommendations with respect to the draft general permit.

(c) If the Deputy Assistant Administrator for Water Enforcement objects to a draft general permit within the period specified in paragraph (b) of this section, the Regional Administrator shall not issue the final general permit until the Deputy Assistant Administrator for Water Enforcement concurs in writing with the conditions of the general permit.

§ 124.59 Conditions requested by the Corps of Engineers and other government agencies.

(*Applicable to State programs, see § 123.25 (NPDES).*) (a) If during the comment period for an NPDES draft permit, the District Engineer advises the Director in writing that anchorage and navigation of any of the waters of the United States would be substantially impaired by the granting of a permit, the permit shall be denied and the applicant so notified. If the District Engineer advised the Director that imposing specified conditions upon the permit is necessary to avoid any substantial impairment of anchorage or navigation, then the Director shall include the specified conditions in the permit. Review or appeal of denial of a permit or of conditions specified by the District Engin shall be made through the applica procedures of the Corps of Engine and may not be made through the p cedures provided in this part. If conditions are stayed by a court competent jurisdiction or by appli ble procedures of the Corps of E neers, those conditions shall be con ered stayed in the NPDES permit the duration of that stay.

(b) If during the comment per the U.S. Fish and Wildlife Service, National Marine Fisheries Service, any other State or Federal age with jurisdiction over fish, wildlife, public health advises the Director writing that the imposition of sp fied conditions upon the permit is n essary to avoid substantial impairm of fish, shellfish, or wildlife resour the Director may include the specif conditions in the permit to the ext they are determined necessary carry out the provisions of § 122 and of the CWA.

(c) In appropriate cases the Direc may consult with one or more of agencies referred to in this secti before issuing a draft permit and m reflect their views in the statement basis, the fact sheet, or the dr permit.

[48 FR 14264, Apr. 1, 1983, as amended a FR 258, Jan. 4, 1989]

§ 124.60 Issuance and effective date stays of NPDES permits.

In addition to the requirements §124.15, the following provisions ap to NPDES permits and to RCRA UIC permits to the extent those p mits may have been consolidated w an NPDES permit in a formal heari

(a)(1) If a request for a formal he ing is granted under § 124.75 § 124.114 regarding the initial pern issued for a new source, a new d charger, or a recommencing discha er, or if a petition for review of denial of a request for a formal he ing with respect to such a permit timely filed with the Administra under § 124.91, the applicant shall without a permit pending final Agen action under § 124.91.

(2) Whenever a source or facil subject to this paragraph or to pa

graph (c)(7) of this section has received a final permit under § 124.15 which is the subject of a hearing request under § 124.74 or a formal hearing under § 124.75, the Presiding Officer, on motion by the source or facility, may issue an order authorizing it to begin discharges (or in the case of RCRA permits, construction or operations) if it complies with all uncontested conditions of the final permit and all other appropriate conditions imposed by the Presiding Officer during the period until final agency action. The motion shall be granted if no party opposes it, or if the source or facility demonstrates that:

(i) It is likely to receive a permit to discharge (or in the case of RCRA permits, to operate or construct) at that site;

(ii) The environment will not be irreparably harmed if the source or facility is allowed to begin discharging (or in the case of RCRA, to begin operating or construction) in compliance with the conditions of the Presiding Officer's order pending final agency action; and

(iii) Its discharge (or in the case of RCRA, its operation or construction) pending final agency action is in the public interest.

(3) *For RCRA only,* no order under paragraph (a)(2) may authorize a facility to commence construction if any party has challenged a construction-related permit term or condition.

(b) The Regional Administrator, at any time prior to the rendering of an initial decision in a formal hearing on a permit, may withdraw the permit and prepare a new draft permit under § 124.6 addressing the portions so withdrawn. The new draft permit shall proceed through the same process of public comment and opportunity for a public hearing as would apply to any other draft permit subject to this part. Any portions of the permit which are not withdrawn and which are not stayed under this section shall remain in effect.

(c)(1) If a request for a formal hearing is granted in whole or in part under § 124.75 regarding a permit for an existing source, or if a petition for review of the denial of a request for a formal hearing with respect to that permit is timely filed with the Administrator under § 124.91, the force and effect of the contested conditions of the final permit shall be stayed. The Regional Administrator shall notify, in accordance with § 124.75, the discharger and all parties of the uncontested conditions of the final permit that are enforceable obligations of the discharger.

(2) When effluent limitations are contested, but the underlying control technology is not, the notice shall identify the installation of the technology in accordance with the permit compliance schedules (if uncontested) as an uncontested, enforceable obligation of the permit.

(3) When a combination of technologies is contested, but a portion of the combination is not contested, that portion shall be identified as uncontested if compatible with the combination of technologies proposed by the requester.

(4) Uncontested conditions, if inseverable from a contested condition, shall be considered contested.

(5) Uncontested conditions shall become enforceable 30 days after the date of notice under paragraph (c)(1) of this section granting the request. If, however, a request for a formal hearing on a condition was denied and the denial is appealed under § 124.91, then that condition shall become enforceable upon the date of the notice of the Administrator's decision on the appeal if the denial is affirmed, or shall be stayed, in accordance with this section, if the Administrator reverses the denial and grants the evidentiary hearing.

(6) Uncontested conditions shall include:

(i) Preliminary design and engineering studies or other requirements necessary to achieve the final permit conditions which do not entail substantial expenditures;

(ii) Permit conditions which will have to be met regardless of which party prevails at the evidentiary hearing;

(iii) When the discharger proposed a less stringent level of treatment than that contained in the final permit, any permit conditions appropriate to meet the levels proposed by the discharger, if the measures required to attain that less stringent level of treatment are consistent with the measures required to attain the limits proposed by any other party; and

(iv) Construction activities, such as segregation of waste streams or installation of equipment, which would partially meet the final permit conditions and could also be used to achieve the discharger's proposed alternative conditions.

(7) If for any offshore or coastal mobile exploratory drilling rig or coastal mobile developmental drilling rig which has never received a finally effective permit to discharge at a "site," but which is not a "new discharger" or a "new source," the Regional Administrator finds that compliance with certain permit conditions may be necessary to avoid irreparable environmental harm during the administrative review, he may specify in the statement of basis or fact sheet that those conditions, even if contested, shall remain enforceable obligations of the discharger during administrative review unless otherwise modified by the Presiding Officer under paragraph (a)(2) of this section.

(d) If at any time after a hearing is granted and after the Regional Administrator's notice under paragraph (c)(1) of this section it becomes clear that a permit requirement is no longer contested, any party may request the Presiding Officer to issue an order identifying the requirements as uncontested. The requirement identified in such order shall become enforceable 30 days after the issuance of the order.

(e) When a formal hearing is granted under § 124.75 on an application for a renewal of an existing permit, all provisions of the existing permit as well as uncontested provisions of the new permit, shall continue fully enforceable and effective until final agency action under § 124.91. (See § 122.6) Upon written request from the applicant, the Regional Administrator may delete requirements from the existing permit which unnecessarily duplicate uncontested provisions of the new permit.

(f) When issuing a finally effective NPDES permit the conditions of which were the subject of a formal
hearing under Subpart E or F, th
gional Administrator shall exten
permit compliance schedule to
extent required by a stay under
section provided that no such e
sion shall be granted which would

(1) Result in the violation of a
plicable statutory deadline; or

(2) Cause the permit to expire
than 5 years after issuance u
§ 124.15(a).

NOTE: Extensions of compliance sche
under § 124.60(f)(2) will not automat
be granted for a period equal to the p
the stay is in effect for an effluent li
tion. For example, if both the Agenc
the discharger agree that a certain
ment technology is required by the
where guidelines do not apply, but a
ing is granted to consider the effluent
tations which the technology will ach
requirements regarding installation o
underlying technology will not be s
during the hearing. Thus, unless the
ing extends beyond the final compl
date in the permit, it will not ordinari
necessary to extend the compliance s
ule. However, when application of an u
lying technology is challenged, the sta
installation requirements relating to
technology would extend for the dur
of the hearing.

(g) For purposes of judicial re
under CWA section 509(b),
agency action on a permit does
occur unless and until a party has
hausted its administrative reme
under Subparts E and F and § 12
Any party which neglects or fail
seek review under § 124.91 the
waives its opportunity to exh
available agency remedies.

(Clean Water Act (33 U.S.C. 1251 *et*
Safe Drinking Water Act (42 U.S.C. 30
seq.), Clean Air Act (42 U.S.C. 7401 *et*
Resource Conservation and Recovery
(42 U.S.C. 6901 *et seq.*))

[48 FR 14264, Apr. 1, 1983, as amended
FR 39620, Sept. 1, 1983]

§ 124.61 Final environmental impact s ment.

No final NPDES permit for a
source shall be issued until at least
days after the date of issuance o
final environmental impact statem
if one is required under 40 CFR 6.

§ 124.62 Decision on variances.

(Applicable to State programs, see § 123.25 (NPDES).)

(a) The Director may grant or deny requests for the following variances (subject to EPA objection under § 123.44 for State permits):

(1) Extensions under CWA section 301(i) based on delay in completion of a publicly owned treatment works;

(2) After consultation with the Regional Administrator, extensions under CWA section 301(k) based on the use of innovative technology; or

(3) Variances under CWA section 316(a) for thermal pollution.

(b) The State Director may deny, or forward to the Regional Administrator with a written concurrence, or submit to EPA without recommendation a completed request for:

(1) A variance based on the economic capability of the applicant under CWA section 301(c); or

(2) A variance based on water quality related effluent limitations under CWA section 302(b)(2).

(c) The Regional Administrator may deny, forward, or submit to the EPA Office Director for Water Enforcement and Permits with a recommendation for approval, a request for a variance listed in paragraph (b) of this section that is forwarded by the State Director, or that is submitted to the Regional Administrator by the requester where EPA is the permitting authority.

(d) The EPA Office Director for Water Enforcement and Permits may approve or deny any variance request submitted under paragraph (c) of this section. If the Office Director approves the variance, the Director may prepare a draft permit incorporating the variance. Any public notice of a draft permit for which a variance or modification has been approved or denied shall identify the applicable procedures for appealing that decision under § 124.64.

(e) The State Director may deny or forward to the Administrator (or his delegate) with a written concurrence a completed request for:

(1) A variance based on the presence of "fundamentally different factors" from those on which an effluent limitations guideline was based;

(2) A variance based upon certain water quality factors under CWA section 301(g).

(f) The Administrator (or his delegate) may grant or deny a request for a variance listed in paragraph (e) of this section that is forwarded by the State Director, or that is submitted to EPA by the requester where EPA is the permitting authority. If the Administrator (or his delegate) approves the variance, the State Director or Regional Administrator may prepare a draft permit incorporating the variance. Any public notice of a draft permit for which a variance or modification has been approved or denied shall identify the applicable procedures for appealing that decision under § 124.64.

[48 FR 14264, Apr. 1, 1983; 50 FR 6941, Feb. 19, 1985, as amended at 51 FR 16030, Apr. 30, 1986; 54 FR 256, 258, Jan. 4, 1989]

§ 124.63 Procedures for variances when EPA is the permitting authority.

(a) In States where EPA is the permit issuing authority and a request for a variance is filed as required by § 122.21, the request shall be processed as follows:

(1)(i) If, at the time, that a request for a variance based on the presence of fundamentally different factors or on section 301(g) of the CWA is submitted, the Regional Administrator has received an application under § 124.3 for issuance or renewal of that permit, but has not yet prepared a draft permit under § 124.6 covering the discharge in question, the Administrator (or his delegate) shall give notice of a tentative decision on the request at the time the notice of the draft permit is prepared as specified in § 124.10, unless this would significantly delay the processing of the permit. In that case the processing of the variance request may be separated from the permit in accordance with paragraph (a)(3) of this section, and the processing of the permit shall proceed without delay.

(ii) If, at the time, that a request for a variance under sections 301(c) or 302(b)(2) of the CWA is submitted, the Regional Administrator has received an application under § 124.3 for issuance or renewal of that permit, but has not yet prepared a draft permit under § 124.6 covering the discharge in question, the Regional Administrator, after obtaining any necessary concurrence of the EPA Deputy Assistant Administrator for Water Enforcement under § 124.62, shall give notice of a tentative decision on the request at the time the notice of the draft permit is prepared as specified in § 124.10, unless this would significantly delay the processing of the permit. In that case the processing of the variance request may be separated from the permit in accordance with paragraph (a)(3) of this section, and the processing of the permit shall proceed without delay.

(2) If, at the time that a request for a variance is filed the Regional Administrator has given notice under § 124.10 of a draft permit covering the discharge in question, but that permit has not yet become final, administrative proceedings concerning that permit may be stayed and the Regional Administrator shall prepare a new draft permit including a tentative decision on the request, and the fact sheet required by § 124.8. However, if this will significantly delay the processing of the existing draft permit or the Regional Administrator, for other reasons, considers combining the variance request and the existing draft permit inadvisable, the request may be separated from the permit in accordance with paragraph (a)(3) of this section, and the administrative dispositon of the existing draft permit shall proceed without delay.

(3) If the permit has become final and no application under § 124.3 concerning it is pending or if the variance request has been separated from a draft permit as described in paragraphs (a) (1) and (2) of this section, the Regional Administrator may prepare a new draft permit and give notice of it under § 124.10. This draft permit shall be accompanied by the fact sheet required by § 124.8 except that the only matters considered shall relate to the requested variance.

[48 FR 14264, Apr. 1, 1983, as amended at 51 FR 16030, Apr. 30, 1986]

§ 124.64 Appeals of variances.

(a) When a State issues a permit on which EPA has made a variance decision, separate appeals of the State permit and of the EPA variance decision are possible. If the owner or operator is challenging the same issues in both proceedings, the Regional Administrator will decide, in consultation with State officials, which case will be heard first.

(b) Variance decisions made by EPA may be appealed under either Subpart E or F, provided the requirements of the applicable subpart are met. However, whenever the basic permit decision is eligible only for an evidentiary hearing under Subpart E while the variance decision is eligible only for a panel hearing under Subpart F, the issues relating to both the basic permit decision and the variance decision shall be considered in the Subpart E proceeding. No Subpart F hearing may be held if a Subpart E hearing would be held in addition. See § 124.111(b).

(c) *Stays for section 301(g) variances.* If a request for an evidentiary hearing is granted on a variance requested under CWA section 301(g), or if a petition for review of the denial of a request for the hearing is filed under § 124.91, any otherwise applicable standards and limitations under CWA section 301 shall not be stayed unless:

(1) In the judgment of the Regional Administrator, the stay or the variance sought will not result in the discharge of pollutants in quantities which may reasonably be anticipated to pose an unacceptable risk to human health or the environment because of bioaccumulation, persistency in the environment, acute toxicity, chronic toxicity, or synergistic propensities; and

(2) In the judgment of the Regional Administrator, there is a substantial likelihood that the discharger will succeed on the merits of its appeal; and

(3) The discharger files a bond or other appropriate security which is required by the Regional Administrator to assure timely compliance with the requirements from which a variance is sought in the event that the appeal is unsuccessful.

(d) Stays for variances other than section 301(g) are governed by § 124.60.

§ 124.65 [Reserved]

§ 124.66 Special procedures for decisions on thermal variances under section 316(a).

(a) Except as provided in § 124.65, the only issues connected with issuance of a particular permit on which EPA will make a final Agency decision before the final permit is issued under §§ 124.15 and 124.60 are whether alternative effluent limitations would be justified under CWA section 316(a) and whether cooling water intake structures will use the best available echnology under section 316(b). Permit applicants who wish an early decision on these issues should request t and furnish supporting reasons at he time their permit applications are iled under § 122.21. The Regional Administrator will then decide whether r not to make an early decision. If it s granted, both the early decision on WA section 316 (a) or (b) issues and he grant of the balance of the permit hall be considered permit issuance nder these regulations, and shall be ubject to the same requirements of ublic notice and comment and the ame opportunity for an evidentiary r panel hearing under Subpart E or .

(b) If the Regional Administrator, n review of the administrative record, etermines that the information necssary to decide whether or not the WA section 316(a) issue is not likely be available in time for a decision n permit issuance, the Regional Adinistrator may issue a permit under 124.15 for a term up to 5 years. This ermit shall require achievement of e effluent limitations initially proosed for the thermal component of e discharge no later than the date herwise required by law. However, e permit shall also afford the perittee an opportunity to file a demonration under CWA section 316(a) ter conducting such studies as are quired under 40 CFR Part 125, Subrt H. A new discharger may not ceed the thermal effluent limitation hich is initially proposed unless and until its CWA section 316(a) variance request is finally approved.

(c) Any proceeding held under paragraph (a) of this section shall be publicly noticed as required by § 124.10 and shall be conducted at a time allowing the permittee to take necessary measures to meet the final compliance date in the event its request for modification of thermal limits is denied.

(d) Whenever the Regional Administrator defers the decision under CWA section 316(a), any decision under section 316(b) may be deferred.

Subpart E—Evidentiary Hearings for EPA-Issued NPDES Permits and EPA-Terminated RCRA Permits

§ 124.71 Applicability.

(a) The regulations in this subpart govern all formal hearings conducted by EPA under CWA sections 402 and 405(f), except those conducted under Subpart F. They also govern all evidentiary hearings conducted under RCRA section 3008 in connection with the termination of a RCRA permit. This includes termination of interim status for failure to furnish information needed to make a final decision. A formal hearing is available to challenge any NPDES permit issued under § 124.15 except for a general permit. Persons affected by a general permit may not challenge the conditions of a general permit as of right in further agency proceedings. They may instead either challenge the general permit in court, or apply for an individual NPDES permit under § 122.21 as authorized in § 122.28 and then request a formal hearing on the issuance or denial of an individual permit. (The Regional Administrator also has the discretion to use the procedures of Subpart F for general permits. See § 124.111).

(b) In certain cases, evidentiary hearings under this subpart may also be held on the conditions of UIC permits, or of RCRA permits which are being issued, modified, or revoked and reissued, rather than terminated or suspended. This will occur when the conditions of the UIC or RCRA permit in question are closely linked with the conditions of an NPDES permit as to which an evidentiary hearing has been granted. See § 124.74(b)(2). Any interested person may challenge the Regional Administrator's initial new source determination by requesting an evidentiary hearing under this part. See § 122.29.

(c) PSD permits may never be subject to an evidentiary hearing under this subpart. Section 124.74(b)(2)(iv) provides only for consolidation of PSD permits with other permits subject to a panel hearing under Subpart F.

[48 FR 14264, Apr. 1, 1983, as amended at 54 FR 18786, May 2, 1989]

§ 124.72 Definitions.

For the purpose of this subpart, the following definitions are applicable:

"Hearing Clerk" means The Hearing Clerk, U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC, 20460.

"Judicial Officer" means a permanent or temporary employee of the Agency appointed as a Judicial Officer by the Administrator under these regulations and subject to the following conditions:

(a) A Judicial Officer shall be a licensed attorney. A Judicial Officer shall not be employed in the Office of Enforcement or the Office of Water and Waste Management, and shall not participate in the consideration or decision of any case in which he or she performed investigative or prosecutorial functions, or which is factually related to such a case.

(b) The Administrator may delegate any authority to act in an appeal of a given case under this subpart to a Judicial Officer who, in addition, may perform other duties for EPA, provided that the delegation shall not preclude a Judicial Officer from referring any motion or case to the Administrator when the Judicial Officer decides such action would be appropriate. The Administrator, in deciding a case, may consult with and assign the drafting of preliminary findings of fact and conclusions and/or a preliminary decision to any Judicial Officer.

"Party" means the EPA trial staff under § 124.78 and any person whose request for a hearing under § 124.74 or whose request to be admitted as a party or to intervene under § 124.79 § 124.117 has been granted.

"Presiding Officer" for the purpo of this subpart means an Administ tive Law Judge appointed under U.S.C. 3105 and designated to presi at the hearing. Under Subpart F oth persons may also serve as hearing of cers. See § 124.119.

"Regional Hearing Clerk" means employee of the Agency designated a Regional Administrator to establi a repository for all books, records, do uments, and other materials relati to hearings under this subpart.

§ 124.73 Filing and submission of doc ments.

(a) All submissions authorized or r quired to be filed with the Agen under this subpart shall be filed wi the Regional Hearing Clerk, unle otherwise provided by regulation. Su missions shall be considered filed the date on which they are mailed delivered in person to the Region Hearing Clerk.

(b) All submissions shall be signe by the person making the submissio or by an attorney or other authorize agent or representative.

(c)(1) All data and information r ferred to or in any way relied upon any submission shall be included full and may not be incorporated reference, unless previously submitte as part of the administrative record the same proceeding. This requirement does not apply to State or Federal statutes and regulations, judicial decisions published in a national repor er system, officially issued EPA documents of general applicability, an any other generally available reference material which may be incorporated by reference. Any party incorporating materials by reference shal provide copies upon request by the Regional Administrator or the Presidin Officer.

(2) If any part of the material submitted is in a foreign language, it shal be accompanied by an English translation verified under oath to be complete and accurate, together with the name, address, and a brief statement of the qualifications of the perso making the translation. Translations

of literature or other material in a foreign language shall be accompanied by copies of the original publication.

(3) Where relevant data or information is contained in a document also containing irrelevant matter, either the irrelevant matter shall be deleted or the relevant portions shall be indicated.

(4) Failure to comply with the requirements of this section or any other requirement in this subpart may result in the noncomplying portions of the submission being excluded from consideration. If the Regional Administrator or the Presiding Officer, on motion by any party or *sua sponte*, determines that a submission fails to meet any requirement of this Subpart, the Regional Administrator or Presiding Officer shall direct the Regional Hearing Clerk to return the submission, together with a reference to the applicable regulations. A party whose materials have been rejected has 14 days to correct the errors and resubmit, unless the Regional Administrator or the Presiding Officer finds good cause to allow a longer time.

(d) The filing of a submission shall not mean or imply that it in fact meets all applicable requirements or that it contains reasonable grounds for the action requested or that the action requested is in accordance with law.

(e) The original of all statements and documents containing factual material, data, or other information shall be signed in ink and shall state the name, address, and the representative capacity of the person making the submission.

§ 124.74 Requests for evidentiary hearing.

(a) Within 30 days following the service of notice of the Regional Administrator's final permit decision under § 124.15, any interested person may submit a request to the Regional Administrator under paragraph (b) of this section for an evidentiary hearing to reconsider or contest that decision. If such a request is submitted by a person other than the permittee, the person shall simultaneously serve a copy of the request on the permittee.

(b)(1) In accordance with § 124.76, such requests shall state each legal or factual question alleged to be at issue, and their relevance to the permit decision, together with a designation of the specific factual areas to be adjudicated and the hearing time estimated to be necessary for adjudication. Information supporting the request or other written documents relied upon to support the request shall be submitted as required by § 124.73 unless they are already part of the administrative record required by § 124.18.

NOTE: This paragraph allows the submission of requests for evidentiary hearings even though both legal and factual issues may be raised, or only legal issues may be raised. In the latter case, because no factual issues were raised, the Regional Administrator would be required to deny the request. However, on review of the denial the Administrator is authorized by § 124.91(a)(1) to review policy or legal conclusions of the Regional Administrator. EPA is requiring an appeal to the Administrator even of purely legal issues involved in a permit decision to ensure that the Administrator will have an opportunity to review any permit before it will be final and subject to judicial review.

(2) Persons requesting an evidentiary hearing on an NPDES permit under this section may also request an evidentiary hearing on a RCRA or UIC permit. PSD permits may never be made part of an evidentiary hearing under Subpart E. This request is subject to all the requirements of paragraph (b)(1) of this section and in addition will be granted only if:

(i) Processing of the RCRA or UIC permit at issue was consolidated with the processing of the NPDES permit as provided in § 124.4;

(ii) The standards for granting a hearing on the NPDES permit are met;

(iii) The resolution of the NPDES permit issues is likely to make necessary or appropriate modification of the RCRA or UIC permit; and

(iv) If a PSD permit is involved, a permittee who is eligible for an evidentiary hearing under Subpart E on his or her NPDES permit requests that the formal hearing be conducted under the procedures of Subpart F and the Regional Administrator finds that consolidation is unlikly to delay final permit issuance beyond the PSD one-year statutory deadline.

(c) These requests shall also contain:

(1) The name, mailing address, and telephone number of the person making such request;

(2) A clear and concise factual statement of the nature and scope of the interest of the requester;

(3) The names and addresses of all persons whom the requester represents; and

(4) A statement by the requester that, upon motion of any party granted by the Presiding Officer, or upon order of the Presiding Officer *sua sponte* without cost or expense to any other party, the requester shall make available to appear and testify, the following:

(i) The requester;

(ii) All persons represented by the requester; and

(iii) All officers, directors, employees, consultants, and agents of the requester and the persons represented by the requester.

(5) Specific references to the contested permit conditions, as well as suggested revised or alternative permit conditions (including permit denials) which, in the judgment of the requester, would be required to implement the purposes and policies of the CWA.

(6) In the case of challenges to the application of control or treatment technologies identified in the statement of basis or fact sheet, identification of the basis for the objection, and the alternative technologies or combination of technologies which the requester believes are necessary to meet the requirements of the CWA.

(7) Identification of the permit obligations that are contested or are inseverable from contested conditions and should be stayed if the request is granted by reference to the particular contested conditions warranting the stay.

(8) Hearing requests also may ask that a formal hearing be held under the procedures set forth in Subpart F. An applicant may make such a request even if the proceeding does not constitute "initial licensing" as defined in § 124.111.

(d) If the Regional Administrator grants an evidentiary hearing request, in whole or in part, the Regional Administrator shall identify the permit conditions which have been cont
by the requester and for which
evidentiary hearing has been gra
Permit conditions which are not
tested or for which the Regiona
ministrator has denied the heari
quest shall not be affected by, o
sidered at, the evidentiary he
The Regional Administrator
specify these conditions in writi
accordance with § 124.60(c).

(e) The Regional Administ
must grant or deny all requests f
evidentiary hearing on a parti
permit. All requests that are gr
for a particular permit shall be
bined in a single evidentiary heari

(f) The Regional Administ
(upon notice to all persons who
already submitted hearing requ
may extend the time allowed for
mitting hearing requests under
section for good cause.

§ 124.75 Decision on request for a he

(a)(1) Within 30 days followin
expiration of the time allowe
§ 124.74 for submitting an eviden
hearing request, the Regional A
istrator shall decide the exten
which, if at all, the request sh
granted, provided that the re
conforms to the requirement
§ 124.74, and sets forth material
of fact relevant to the issuance o
permit.

(2) When an NPDES permi
which a hearing request has
granted constitutes "initial licen
under § 124.111, the Regional Adm
trator may elect to hold a formal
ing under the procedures of Subp
rather than under the procedur
this subpart even if no person h
quested that Subpart F be appli
the Regional Administrator m
such a decision, he or she shall is
notice of hearing under § 124.11
subsequent proceedings shall the
governed by §§ 124.117 thr
124.121, except that any referenc
draft permit shall mean the
permit.

(3) Whenever the Regional Adm
trator grants a request made u
§ 124.74(c)(8) for a formal he
under Subpart F on an NPDES p
that does not constitute an initi

cense under § 124.111, the Regional Administrator shall issue a notice of hearing under § 124.116 including a statement that the permit will be processed under the procedures of Subpart F unless a written objection is received within 30 days. If no valid objection is received, the application shall be processed in accordance with §§ 124.117 through 124.121, except that any reference to a draft permit shall mean the final permit. If a valid objection is received, this subpart shall be applied instead.

(b) If a request for a hearing is denied in whole or in part, the Regional Administrator shall briefly state the reasons. That denial is subject to review by the Administrator under § 124.91.

§ 124.76 Obligation to submit evidence and raise issues before a final permit is issued.

In any case where the Regional Administrator elected to apply the requirements of § 124.14(a), no evidence shall be submitted by any party to a hearing under this Subpart that was not submitted to the administrative record required by § 124.18 as part of the preparation of and comment on a draft permit, unless good cause is shown for the failure to submit it. No issues shall be raised by any party that were not submitted to the administrative record required by § 124.18 as part of the preparation of and comment on a draft permit unless good cause is shown for the failure to submit them. Good cause includes the case where the party seeking to raise the new issues or introduce new information shows that it could not reasonably have ascertained the issues or made the information available within the time required by § 124.15; or that it could not have reasonably anticipated the relevance or materiality of the information sought to be introduced. Good cause exists for the introduction of data available on operation authorized under § 124.60(a)(2).

[49 FR 38051, Sept. 26, 1984]

§ 124.77 Notice of hearing.

Public notice of the grant of an evidentiary hearing regarding a permit shall be given as provided in § 124.57(b) and by mailing a copy to all persons who commented on the draft permit, testified at the public hearing, or submitted a request for a hearing. Before the issuance of the notice, the Regional Administrator shall designate the Agency trial staff and the members of the decisional body (as defined in § 124.78).

§ 124.78 Ex parte communications.

(a) For purposes of this section, the following definitions shall apply:

(1) "Agency trial staff" means those Agency employees, whether temporary or permanent, who have been designated by the Agency under § 124.77 or § 124.116 as available to investigate, litigate, and present the evidence, arguments, and position of the Agency in the evidentiary hearing or nonadversary panel hearing. Any EPA employee, consultant, or contractor who is called as a witness by EPA trial staff, or who assisted in the formulation of the draft permit which is the subject of the hearing, shall be designated as a member of the Agency trial staff;

(2) "Decisional body" means any Agency employee who is or may reasonably be expected to be involved in the decisional process of the proceeding including the Administrator, Judicial Officer, Presiding Officer, the Regional Administrator (if he or she does not designate himself or herself as a member of the Agency trial staff), and any of their staff participating in the decisional process. In the case of a nonadversary panel hearing, the decisional body shall also include the panel members, whether or not permanently employed by the Agency;

(3) "*Ex parte* communication" means any communication, written or oral, relating to the merits of the proceeding between the decisional body and an interested person outside the Agency or the Agency trial staff which was not originally filed or stated in the administrative record or in the hearing. *Ex parte* communications do not include:

(i) Communications between Agency employees other than between the Agency trial staff and the members of the decisional body;

(ii) Discussions between the decisional body and either:

(A) Interested persons outside the Agency, or

(B) The Agency trial staff, *if* all parties have received prior written notice of the proposed communications and have been given the opportunity to be present and participate therein.

(4) "Interested person outside the Agency" includes the permit applicant, any person who filed written comments in the proceeding, any person who requested the hearing, any person who requested to participate or intervene in the hearing, any participant in the hearing and any other interested person not employed by the Agency at the time of the communications, and any attorney of record for those persons.

(b)(1) No interested person outside the Agency or member of the Agency trial staff shall make or knowingly cause to be made to any members of the decisional body, an *ex parte* communication on the merits of the proceedings.

(2) No member of the decisional body shall make or knowingly cause to be made to any interested person outside the Agency or member of the Agency trial staff, an *ex parte* communication on the merits of the proceedings.

(3) A member of the decisional body who receives or who makes or who knowingly causes to be made a communication prohibited by this subsection shall file with the Regional Hearing Clerk all written communications or memoranda stating the substance of all oral communications together with all written responses and memoranda stating the substance of all oral responses.

(c) Whenever any member of the decisionmaking body receives an *ex parte* communication knowingly made or knowingly caused to be made by a party or representative of a party in violation of this section, the person presiding at the stage of the hearing then in progress may, to the extent consistent with justice and the policy of the CWA, require the party to show cause why its claim or interest in the proceedings should not be dismissed, denied, disregarded, or otherwise adversely affected on account of s
violation.

(d) The prohibitions of this sect
begin to apply upon issuance of
notice of the grant of a hearing un
§ 124.77 or § 124.116. This prohibit
terminates at the date of final age
action.

[48 FR 14264, Apr. 1, 1983, as amended a
FR 38052, Sept. 26, 1984]

§ 124.79 Additional parties and issues.

(a) Any person may submit a requ
to be admitted as a party within
days after the date of mailing, publi
tion, or posting of notice of the gr
of an evidentiary hearing, whiche
occurs last. The Presiding Offi
shall grant requests that meet the
quirements of §§ 124.74 and 124.76.

(b) After the expiration of the ti
prescribed in paragraph (a) of this s
tion any person may file a motion
leave to intervene as a party. T
motion must meet the requirements
§§ 124.74 and 124.76 and set forth t
grounds for the proposed interventi
No factual or legal issues, besi
those raised by timely hearing
quests, may be proposed except
good cause. A motion for leave to
tervene must also contain a verif
statement showing good cause for t
failure to file a timely request to
admitted as a party. The Presiding
ficer shall grant the motion only up
an express finding on the record th

(1) Extraordinary circumstances j
tify granting the motion;

(2) The intervener has consented
be bound by:

(i) Prior written agreements a
stipulations by and between the exi
ing parties; and

(ii) All orders previously entered
the proceedings; and

(3) Intervention will not cause und
delay or prejudice the rights of the e
isting parties.

§ 124.80 Filing and service.

(a) An original and one (1) copy
all written submissions relating to
evidentiary hearing filed after t
notice is published shall be filed wi
the Regional Hearing Clerk.

(b) The party filing any submissi
shall also serve a copy of each submi

sion upon the Presiding Officer and each party of record. Service shall be by mail or personal delivery.

(c) Every submission shall be accompanied by an acknowledgment of service by the person served or a certificate of service citing the date, place, time, and manner of service and the names of the persons served.

(d) The Regional Hearing Clerk shall maintain and furnish a list containing the name, service address, and telephone number of all parties and their attorneys or duly authorized representatives to any person upon request.

§ 124.81 Assignment of Administrative Law Judge.

No later than the date of mailing, publication, or posting of the notice of a grant of an evidentiary hearing, whichever occurs last, the Regional Administrator shall refer the proceeding to the Chief Administrative Law Judge who shall assign an Administrative Law Judge to serve as Presiding Officer for the hearing.

§ 124.82 Consolidation and severance.

(a) The Administrator, Regional Administrator, or Presiding Officer has the discretion to consolidate, in whole or in part, two or more proceedings to be held under this subpart, whenever it appears that a joint hearing on any or all of the matters in issue would expedite or simplify consideration of the issues and that no party would be prejudiced thereby. Consolidation shall not affect the right of any party to raise issues that might have been raised had there been no consolidation.

(b) If the Presiding Officer determines consolidation is not conducive to an expeditious, full, and fair hearing, any party or issues may be severed and heard in a separate proceeding.

§ 124.83 Prehearing conferences.

(a) The Presiding Officer, *sua sponte*, or at the request of any party, may direct the parties or their attorneys or duly authorized representatives to appear at a specified time and place for one or more conferences before or during a hearing, or to submit written proposals or correspond for the purpose of considering any of the matters set forth in paragraph (c) of this section.

(b) The Presiding Officer shall allow a reasonable period before the hearing begins for the orderly completion of all prehearing procedures and for the submission and disposition of all prehearing motions. Where the circumstances warrant, the Presiding Officer may call a prehearing conference to inquire into the use of available procedures contemplated by the parties and the time required for their completion, to establish a schedule for their completion, and to set a tentative date for beginning the hearing.

(c) In conferences held, or in suggestions submitted, under paragraph (a) of this section, the following matter may be considered:

(1) Simplification, clarification, amplification, or limitation of the issues.

(2) Admission of facts and of the genuineness of documents, and stipulations of facts.

(3) Objections to the introduction into evidence at the hearing of any written testimony, documents, papers, exhibits, or other submissions proposed by a party, except that the administrative record required by § 124.19 shall be received in evidence subject to the provisions of § 124.85(d)(2). At any time before the end of the hearing any party may make, and the Presiding Officer shall consider and rule upon, motions to strike testimony or other evidence other than the administrative record on the grounds of relevance, competency, or materiality.

(4) Matters subject to official notice may be taken.

(5) Scheduling as many of the following as are deemed necessary and proper by the Presiding Officer:

(i) Submission of narrative statements of position on each factual issue in controversy;

(ii) Submission of written testimony and documentary evidence (e.g., affidavits, data, studies, reports, and any other type of written material) in support of those statements; or

(iii) Requests by any party for the production of additional documentation, data, or other information relevant and material to the facts in issue.

(6) Grouping participants with substantially similar interests to eliminate redundant evidence, motions, and objections.

(7) Such other matters that may expedite the hearing or aid in the disposition of the matter.

(d) At a prehearing conference or at some other reasonable time set by the Presiding Officer, each party shall make available to all other parties the names of the expert and other witnesses it expects to call. At its discretion or at the request of the Presiding Officer, a party may include a brief narrative summary of any witness's anticipated testimony. Copies of any written testimony, documents, papers, exhibits, or materials which a party expects to introduce into evidence, and the administrative record required by § 124.18 shall be marked for identification as ordered by the Presiding Officer. Witnesses, proposed written testimony, and other evidence may be added or amended upon order of the Presiding Officer for good cause shown. Agency employees and consultants shall be made available as witnesses by the Agency to the same extent that production of such witnesses is required of other parties under § 124.74(c)(4). (See also § 124.85(b)(16).)

(e) The Presiding Officer shall prepare a written prehearing order reciting the actions taken at each prehearing conference and setting forth the schedule for the hearing, unless a transcript has been taken and accurately reflects these matters. The order shall include a written statement of the areas of factual agreement and disagreement and of the methods and procedures to be used in developing the evidence and the respective duties of the parties in connection therewith. This order shall control the subsequent course of the hearing unless modified by the Presiding Officer for good cause shown.

§ 124.84 Summary determination.

(a) Any party to an evidentiary hearing may move with or without supporting affidavits and briefs for a summary determination in its favor upon any of the issues being adjudicated on the basis that there is no genuine issue of material fact for determination. This motion shall be filed at least 45 days before the date set for the hearing, except that upon good cause shown the motion may be filed at any time before the close of the hearing.

(b) Any other party may, within 30 days after service of the motion, file and serve a response to it or a countermotion for summary determination. When a motion for summary determination is made and supported, a party opposing the motion may not rest upon mere allegations or denials but must show, by affidavit or by other materials subject to consideration by the Presiding Officer, that there is a genuine issue of material fact for determination at the hearing.

(c) Affidavits shall be made on personal knowledge, shall set forth facts that would be admissible in evidence and shall show affirmatively that the affiant is competent to testify to the matters stated therein.

(d) The Presiding Officer may set the matter for oral argument and call for the submission of proposed findings, conclusions, briefs, or memoranda of law. The Presiding Officer shall rule on the motion not more than 30 days after the date responses to the motion are filed under paragraph (b) of this section.

(e) If all factual issues are decided by summary determination, no hearing will be held and the Presiding Officer shall prepare an initial decision under § 124.89. If summary determination is denied or if partial summary determination is granted, the Presiding Officer shall issue a memorandum opinion and order, interlocutory in character, and the hearing will proceed on the remaining issues. Appeals from interlocutory rulings are governed by § 124.90.

(f) Should it appear from the affidavits of a party opposing a motion for summary determination that he or she cannot for reasons stated present, by affidavit or otherwise, facts essential to justify his or her opposition, the Presiding Officer may deny the motion or order a continuance to allow additional affidavits or other information to be obtained or may make such other order as is just and proper.

124.85 Hearing procedure.

(a)(1) The permit applicant always ears the burden of persuading the gency that a permit authorizing pol- utants to be discharged should be sued and not denied. This burden oes not shift.

Note: In many cases the documents con- ined in the administrative record, in par- cular the fact sheet or statement of basis nd the response to comments, should ade- uately discharge this burden.

(2) The Agency has the burden of oing forward to present an affirma- ve case in support of any challenged ndition of a final permit.

(3) Any hearing participant who, by ising material issues of fact, con- nds:

(i) That particular conditions or re- uirements in the permit are improper invalid, and who desires either:

(A) The inclusion of new or different nditions or requirements; or

(B) The deletion of those conditions requirements; or

(ii) That the denial or issuance of a rmit is otherwise improper or in- lid, shall have the burden of going rward to present an affirmative case the conclusion of the Agency case the challenged requirement.

(b) The Presiding Officer shall con- ct a fair and impartial hearing, take tion to avoid unnecessary delay in e disposition of the proceedings, and aintain order. For these purposes, e Presiding Officer may:

1) Arrange and issue notice of the te, time, and place of hearings and nferences;

2) Establish the methods and proce- res to be used in the development of e evidence;

3) Prepare, after considering the ews of the participants, written atements of areas of factual dis- reement among the participants;

4) Hold conferences to settle, sim- ify, determine, or strike any of the ues in a hearing, or to consider her matters that may facilitate the peditious disposition of the hearing;

5) Administer oaths and affirma- ns;

6) Regulate the course of the hear- and govern the conduct of partici- nts;

7) Examine witnesses;

(8) Identify and refer issues for interlocutory decision under § 124.90;

(9) Rule on, admit, exclude, or limit evidence;

(10) Establish the time for filing motions, testimony, and other written evidence, briefs, findings, and other submissions;

(11) Rule on motions and other procedural matters pending before him, including but not limited to motions for summary determination in accordance with § 124.84;

(12) Order that the hearing be conducted in stages whenever the number of parties is large or the issues are numerous and complex;

(13) Take any action not inconsistent with the provisions of this subpart for the maintenance of order at the hearing and for the expeditious, fair, and impartial conduct of the proceeding;

(14) Provide for the testimony of opposing witnesses to be heard simultaneously or for such witnesses to meet outside the hearing to resolve or isolate issues or conflicts;

(15) Order that trade secrets be treated as confidential business information in accordance with §§ 122.7 (NPDES) and 270.12 (RCRA) and 40 CFR Part 2; and

(16) Allow such cross-examination as may be required for a full and true disclosure of the facts. No cross-examination shall be allowed on questions of policy except to the extent required to disclose the factual basis for permit requirements, or on questions of law, or regarding matters (such as the validity of effluent limitations guidelines) that are not subject to challenge in an evidentiary hearing. No Agency witnesses shall be required to testify or be made available for cross-examination on such matters. In deciding whether or not to allow cross-examination, the Presiding Officer shall consider the likelihood of clarifying or resolving a disputed issue of material fact compared to other available methods. The party seeking cross-examination has the burden of demonstrating that this standard has been met.

(c) All direct and rebuttal evidence at an evidentiary hearing shall be submitted in written form, unless, upon motion and good cause shown, the

Presiding Officer determines that oral presentation of the evidence on any particular fact will materially assist in the efficient identification and clarification of the issues. Written testimony shall be prepared in narrative form.

(d)(1) The Presiding Officer shall admit all relevant, competent, and material evidence, except evidence that is unduly repetitious. Evidence may be received at any hearing even though inadmissible under the rules of evidence applicable to judicial proceedings. The weight to be given evidence shall be determined by its reliability and probative value.

(2) The administrative record required by § 124.18 shall be admitted and received in evidence. Upon motion by any party the Presiding Officer may direct that a witness be provided to sponsor a portion or portions of the administrative record. The Presiding Officer, upon finding that the standards in § 124.85(b)(3) have been met, shall direct the appropriate party to produce the witness for cross-examination. If a sponsoring witness cannot be provided, the Presiding Officer may reduce the weight accorded the appropriate portion of the record.

NOTE: Receiving the administrative record into evidence automatically serves several purposes: (1) It documents the prior course of the proceedings; (2) it provides a record of the views of affected persons for consideration by the agency decisionmaker; and (3) it provides factual material for use by the decisionmaker.

(3) Whenever any evidence or testimony is excluded by the Presiding Officer as inadmissible, all such evidence or testimony existing in written form shall remain a part of the record as an offer of proof. The party seeking the admission of oral testimony may make an offer of proof, by means of a brief statement on the record describing the testimony excluded.

(4) When two or more parties have substantially similar interests and positions, the Presiding Officer may limit the number of attorneys or other party representatives who will be permitted to cross-examine and to make and argue motions and objections on behalf of those parties. Attorneys may, however, engage in cross-examination relevant to matters not adequately covered by previous cross-e amination.

(5) Rulings of the Presiding Office on the admissibility of evidence or te timony, the propriety of cross-exam nation, and other procedural matter shall appear in the record and sha control further proceedings, unless r versed as a result of an interlocutor appeal taken under § 124.90.

(6) All objections shall be mad promptly or be deemed waived. Partie shall be presumed to have taken e ception to an adverse ruling. No objec tion shall be deemed waived by fur ther participation in the hearing.

(e) *Admission of evidence on envi ronmental impacts.* If a hearing i granted under this subpart for a ne source subject to NEPA, the Presidin Officer may admit evidence relevan to any environmental impacts of th permitted facility if the evidenc would be relevant to the Agency's obli gation under § 122.29(c)(3). If th source holds a final EPA-issue RCRA, PSD, or UIC permit, or a ocean dumping permit under th Marine Protection, Research, an Sanctuaries Act (MPRSA), no such evidence shall be admitted nor shall cross-examination be allowed relating to:

(1) Effects on air quality, (2) effects attributable to underground injection or hazardous waste management practices, or (3) effects of ocean dumping subject to the MPRSA, which were considered or could have been considered in the PSD, RCRA, UIC, or MPRSA permit issuance proceedings. However, the presiding officer may admit without cross-examination or any supporting witness relevant portions of the record of PSD, RCRA, UIC, or MPRSA permit issuance proceedings.

[48 FR 14264, Apr. 1, 1983, as amended at 4 FR 38052, Sept. 26, 1984]

§ 124.86 Motions.

(a) Any party may file a motion (including a motion to dismiss a particular claim on a contested issue) with the Presiding Officer on any matter relating to the proceeding. All motions shall be in writing and served as provided in § 124.80 except those made on the record during an oral hearing before the Presiding Officer.

(b) Within 10 days after service of any written motion, any part to the proceeding may file a response to the motion. The time for response may be shortened to 3 days or extended for an additional 10 days by the Presiding Officer for good cause shown.

(c) Notwithstanding § 122.4, any party may file with the Presiding Officer a motion seeking to apply to the permit any regulatory or statutory provision issued or made available after the issuance of the permit under § 124.15. The Presiding Officer shall grant any motion to apply a new statutory provision unless he or she finds it contrary to legislative intent. The Presiding Officer may grant a motion to apply a new regulatory requirement when appropriate to carry out the purpose of CWA, and when no party would be unduly prejudiced thereby.

§ 124.87 Record of hearings.

(a) All orders issued by the Presiding Officer, transcripts of oral hearings or arguments, written statements of position, written direct and rebuttal testimony, and any other data, studies, reports, documentation, information and other written material of any kind submitted in the proceeding shall be a part of the hearing record and shall be available to the public except as provided in §§ 122.7 (NPDES) and 270.12 (RCRA), in the Office of the Regional Hearing Clerk, as soon as it is received in that office.

(b) Evidentiary hearings shall be either stenographically reported verbatim or tape recorded, and thereupon transcribed. After the hearing, the reporter shall certify and file with the Regional Hearing Clerk:

(1) The original of the transcript, nd

(2) The exhibits received or offered nto evidence at the hearing.

(c) The Regional Hearing Clerk shall promptly notify each of the parties of he filing of the certified transcript of proceedings. Any party who desires a copy of the transcript of the hearing may obtain a copy of the hearing transcript from the Regional Hearing Clerk upon payment of costs.

(d) The Presiding Officer shall allow witnesses, parties, and their counsel an opportunity to submit such written proposed corrections of the transcript of any oral testimony taken at the hearing, pointing out errors that may have been made in transcribing the testimony, as are required to make the transcript conform to the testimony. Except in unusual cases, no more than 30 days shall be allowed for submitting such corrections from the day a complete transcript of the hearing becomes available.

§ 124.88 Proposed findings of fact and conclusions; brief.

Within 45 days after the certified transcript is filed, any party may file with the Regional Hearing Clerk proposed findings of fact and conclusions of law and a brief in support thereof. Briefs shall contain appropriate references to the record. A copy of these findings, conclusions, and brief shall be served upon all the other parties and the Presiding Officer. The Presiding Officer, for good cause shown, may extend the time for filing the proposed findings and conclusions and/or the brief. The Presiding Officer may allow reply briefs.

§ 124.89 Decisions.

(a) The Presiding Officer shall review and evaluate the record, including the proposed findings and conclusions, any briefs filed by the parties, and any interlocutory decisions under § 124.90 and shall issue and file his initial decision with the Regional Hearing Clerk. The Regional Hearing Clerk shall immediately serve copies of the initial decision upon all parties (or their counsel of record) and the Administrator.

(b) The initial decision of the Presiding Officer shall automatically become the final decision 30 days after its service unless within that time:

(1) A party files a petition for review by the Administrator pursuant to § 124.91; or

(2) The Administrator *sua sponte* files a notice that he or she will review the decision pursuant to § 124.91.

§ 124.90 Interlocutory appeal.

(a) Except as provided in this section, appeals to the Administrator may be taken only under § 124.91. Appeals from orders or rulings may be taken under this section only if the Presiding Officer, upon motion of a party, certifies those orders or rulings to the Administrator for appeal on the record. Requests to the Presiding Officer for certification must be filed in writing within 10 days of service of notice of the order, ruling, or decision and shall state briefly the grounds relied on.

(b) The Presiding Officer may certify an order or ruling for appeal to the Administrator if:

(1) The order or ruling involves an important question on which there is substantial ground for difference of opinion, and

(2) *Either:* (i) An immediate appeal of the order or ruling will materially advance the ultimate completion of the proceeding; or

(ii) A review after the final order is issued will be inadequate or ineffective.

(c) If the Administrator decides that certification was improperly granted, he or she shall decline to hear the appeal. The Administrator shall accept or decline all interlocutory appeals within 30 days of their submission; if the Administrator takes no action within that time, the appeal shall be automatically dismissed. When the Presiding Officer declines to certify an order or ruling to the Administrator for an interlocutory appeal, it may be reviewed by the Administrator only upon appeal from the initial decision of the Presiding Officer, except when the Administrator determines, upon motion of a party and in exceptional circumstances, that to delay review would not be in the public interest. Such motion shall be made within 5 days after receipt of notification that the Presiding Officer has refused to certify an order or ruling for interlocutory appeal to the Administrator. Ordinarily, the interlocutory appeal will be decided on the basis of the submissions made to the Presiding Officer. The Administrator may, however, allow briefs and oral argument.

(d) In exceptional circumstances, th Presiding Officer may stay the pr ceeding pending a decision by the A ministrator upon an order or rulin certified by the Presiding Officer f an interlocutory appeal, or upon th denial of such certification by the Pr siding Officer.

(e) The failure to request an inte locutory appeal shall not preve taking exception to an order or rulin in an appeal under § 124.91.

§ 124.91 Appeal to the Administrator.

(a)(1) Within 30 days after service o an initial decision, or a denial in who or in part of a request for an evide tiary hearing, any party or requeste as the case may be, may appeal an matter set forth in the initial decisi or denial, or any adverse order o ruling to which the party objecte during the hearing, by filing with th Administrator notice of appeal and p tition for review. The petition shall i clude a statement of the supportin reasons and, when appropriate, showing that the initial decision co tains:

(i) A finding of fact or conclusion o law which is clearly erroneous, or

(ii) An exercise of discretion o policy which is important and whic the Administrator should review.

(2) Within 15 days after service of petition for review under paragrap (c)(1) of this section, any other par to the proceeding may file a respo sive petition.

(3) Policy decisions made or leg conclusions drawn in the course of d nying a request for an evidentiar hearing may be reviewed and change by the Administrator in an appe under this section.

(b) Within 30 days of an initial deci sion or denial or a request for an ev dentiary hearing the Administrato may, *sua sponte*, review such decisio Within 7 days after the Administrato has decided under this section t review an initial decision or the deni of a request for an evidentiary hea ing, notice of that decision shall b served by mail upon all affected pa ties and the Regional Administrator.

(c)(1) Within a reasonable time fo lowing the filing of the petition fo review, the Administrator shall issue an order either granting or denying the petition for review. When the Administrator grants a petition for review or determines under paragraph (b) of this section to review a decision, the Administrator may notify the parties that only certain issues shall be briefed.

(2) Upon granting a petition for review, the Regional Hearing Clerk shall promptly forward a copy of the record to the Judicial Officer and shall retain a complete duplicate copy of the record in the Regional Office.

(d) Notwithstanding the grant of a petition for review or a determination under paragraph (b) of this section to review a decision, the Administrator may summarily affirm without opin-on and initial decision or the denial of request for an evidentiary hearing.

(e) A petition to the Administrator under paragraph (a) of this section for eview of any initial decision or the enial of an evidentiary hearing is, nder 5 U.S.C. 704, a prerequisite to he seeking of judicial review of the inal decision of the Agency.

(f) If a party timely files a petition or review or if the Administrator *sua ponte* orders review, then, for pur-oses of judicial review, final Agency ction on an issue occurs as follows:

(1) If the Administrator denies eview or summarily affirms without pinion as provided in § 124.91(d), hen the initial decision or denial be-omes the final Agency action and ccurs upon the service of notice of he Administrator's action.

(2) If the Administrator issues a de-sion without remanding the proceed-g then the final permit, redrafted as equired by the Administrator's origi-al decision, shall be reissued and erved upon all parties to the appeal.

(3) If the Administrator issues a de-sion remanding the proceeding, then nal Agency action occurs upon com-etion of the remanded proceeding, cluding any appeals to the Adminis-ator from the results of the remand-l proceeding.

(g) The petitioner may file a brief in pport of the petition within 21 days ter the Administrator has granted a etition for review. Any other party ay file a responsive brief within 21 days of service of the petitioner's brief. The petitioner then may file a reply brief within 14 days of service of the responsive brief. Any person may file an *amicus brief* for the consideration of the Administrator within the same time periods that govern reply briefs. If the Administrator determines, *sua sponte*, to review an initial Regional Administrator's decision or the denial of a request for an evidentiary hearing, the Administrator shall notify the parties of the schedule for filing briefs.

(h) Review by the Administrator of an initial decision or the denial of an evidentiary hearing shall be limited to the issues specified under paragraph (a) of this section, except that after notice to all parties, the Administrator may raise and decide other matters which he or she considers material on the basis of the record.

Subpart F—Non-Adversary Panel Procedures

§ 124.111 Applicability.

(a) Except as set forth in this subpart, this subpart applies in lieu of, and to complete exclusion of, Subparts A through E in the following cases:

(1)(i) In any proceedings for the issuance of any NPDES permit under CWA sections 402 and 405(f) which constitute "initial licensing" under the Administrative Procedure Act, when the Regional Administrator elects to apply this subpart and explicitly so states in the public notice of the draft permit under § 124.10 or in a supplemental notice under § 124.14. If an NPDES draft permit is processed under this subpart, any other draft permits which have been consolidated with the NPDES draft permit under § 124.4 shall likewise be processed under this subpart, except for PSD permits when the Regional Administrator makes a finding under § 124.4(e) that consolidation would be likely to result in missing the one year statutory deadline for issuing a final PSD permit under the CAA.

(ii) "Initial licensing" includes both the first decision on an NPDES permit applied for by a discharger that has not previously held one and the first decision on any variance requested by a discharger.

(iii) To the extent this subpart is used to process a request for a variance under CWA section 301(h), the term "Administrator or a person designated by the Administrator" shall be substituted for the term "Regional Administrator".

(2) In any proceeding for which a hearing under this subpart was granted under § 124.75 following a request for a formal hearing under § 124.74. See §§ 124.74(c)(8) and 124.75(a)(2).

(3) Whenever the Regional Administrator determines as a matter of discretion that the more formalized mechanisms of this subpart should be used to process draft NPDES general permits (for which evidentiary hearings are unavailable under § 124.71), or draft RCRA or draft UIC permits.

(b) EPA shall not apply these procedures to a decision on a variance where Subpart E proceedings are simultaneously pending on the other conditions of the permit. See § 124.64(b).

[48 FR 14264, Apr. 1, 1983, as amended at 54 FR 18786, May 2, 1989]

§ 124.112 Relation to other subparts.

The following provisions of Subparts A through E apply to proceedings under this subpart:

(a)(1) Sections 124.1 through 124.10.

(2) Section 124.14 "Reopening of comment period."

(3) Section 124.16 "Stays of contested permit conditions."

(4) Section 124.20 "Computation of time."

(b)(1) Section 124.41 "Definitions applicable to PSD Permits."

(2) Section 124.42 "Additional procedures for PSD permits affecting Class I Areas."

(c)(1) Sections 124.51 through 124.56.

(2) Section 124.57(c) "Public notice."

(3) Sections 124.58 through 124.66.

(d)(1) Section 124.72 "Definitions," except for the definition of "Presiding Officer," see section 124.119.

(2) Section 124.73 "Filing."

(3) Section 124.78 "*Ex parte* communications."

(4) Section 124.80 "Filing and service."

(5) Section 124.85(a) (Burden
proof).

(6) Section 124.86 "Motions."

(7) Section 124.87 "Record of hea
ings."

(8) Section 124.90 "Interlocuto
appeal."

(e) In the case of permits to whi
this subpart is made applicable after
final permit has been issued und
§ 124.15, either by the grant und
§ 124.75 of a hearing request und
§ 124.74, or by notice of supplemen
proceedings under § 124.14, §§ 124
and 124.76 shall also apply.

§ 124.113 Public notice of draft per and public comment period.

Public notice of a draft permit und
this subpart shall be given as pro
in §§ 124.10 and 124.57. At the
tion of the Regional Administrat
the public comment period specified
this notice may include an opportu
ty for a public hearing under § 124

§ 124.114 Request for hearing.

(a) By the close of the comme
period under § 124.113, any pers
may request the Regional Administ
tor to hold a panel hearing on
draft permit by submitting a writ
request containing the following:

(1) A brief statement of the inter
of the person requesting the hearing

(2) A statement of any objections
the draft permit;

(3) A statement of the issues wh
such person proposes to raise for
sideration at the hearing; and

(4) Statements meeting the requi
ments of § 124.74(c)(1)–(5).

(b) Whenever (1) a written requ
satisfying the requirements of pa
graph (a) of this section has been
ceived and presents genuine issues
material fact, or (2) the Regional
ministrator determines *sua spo*
that a hearing under this subpart
necessary or appropriate, the Regio
Administrator shall notify each pers
requesting the hearing and the app
cant, and shall provide public not
under § 124.57(c). If the Regional
ministrator determines that a requ
does not meet the requirements
paragraph (a) of this section or d
not present genuine issues of fact,

egional Administrator may deny the equest for the hearing and shall serve ritten notice of that determination n all persons requesting the hearing.

(c) The Regional Administrator may so decide before a draft permit is epared under § 124.6 that a hearing ould be held under this section. In ch cases, the public notice of the aft permit shall explicitly so state d shall contain the information reired by § 124.57(c). This notice may o provide for a hearing under 24.12 before a hearing is conducted der this section.

24.115 Effect of denial of or absence of request for hearing.

f no request for a hearing is made der § 124.114, or if all such requests denied under that section, the Renal Administrator shall then pree a recommended decision under 24.124. Any person whose hearing uest has been denied may then eal that recommended decision to Administrator as provided in 24.91.

4.116 Notice of hearing.

) Upon granting a request for a ring under § 124.114 the Regional ninistrator shall promptly publish otice of the hearing as required er § 124.57(c). The mailed notice ll include a statement which indis whether the Presiding Officer or Regional Administrator will issue Recommended decision. The led notice shall also allow the parants at least 30 days to submit ten comments as provided under 4.118.

) The Regional Administrator may give notice of a hearing under this ion at the same time as notice of a t permit under § 124.113. In that the comment periods under 24.113 and 124.118 shall be merged held as a single public comment od.

The Regional Administrator may give notice of hearing under this on in response to a hearing ret under § 124.74 as provided in .75.

§ 124.117 Request to participate in hearing.

(a) Persons desiring to participate in any hearing noticed under this section, shall file a request to participate with the Regional Hearing Clerk before the deadline set forth in the notice of the grant of the hearing. Any person filing such a request becomes a party to the proceedings within the meaning of the Administrative Procedure Act. The request shall include:

(1) A brief statement of the interest of the person in the proceeding;

(2) A brief outline of the points to be addressed;

(3) An estimate of the time required; and

(4) The requirements of § 124.74(c)(1)-(5).

(5) If the request is submitted by an organization, a nonbinding list of the persons to take part in the presentation.

(b) As soon as practicable, but in no event later than 2 weeks before the scheduled date of the hearing, the Presiding Officer shall make a hearing schedule available to the public and shall mail it to each person who requested to participate in the hearing.

§ 124.118 Submissiom of written comments on draft permit.

(a) No later than 30 days before the scheduled start of the hearing (or such other date as may be set forth in the notice of hearing), each party shall file all of its comments on the draft permit, based on information in the administrative record and any other information which is or reasonably could have been available to that party. All comments shall include any affidavits, studies, data, tests, or other materials relied upon for making any factual statements in the comments.

(b)(1) Written comments filed under paragraph (a) of this section shall constitute the bulk of the evidence submitted at the hearing. Oral statements at the hearing should be brief and in the nature of argument. They shall be restricted either to points that could not have been made in written comments, or to emphasize points which are made in the comments, but which the party believes can more effectively be argued in the hearing context.

(2) Notwithstanding the foregoing, within two weeks prior to the deadline specified in paragraph (a) of this section for the filing of comments, any party may move to submit all or part of its comments orally at the hearing in lieu of submitting written comments and the Presiding Officer shall, within one week, grant such motion if the Presiding Officer finds that the party will be prejudiced if required to submit the comments in written form.

(c) Parties to any hearing may submit written material in response to the comments filed by other parties under paragraph (a) of this section at the time they appear at the panel stage of the hearing under § 124.120.

§ 124.119 Presiding Officer.

(a)(1)(i) Before giving notice of a hearing under this subpart in a proceeding involving an NPDES permit, the Regional Administrator shall request that the Chief Administrative Law Judge assign an Administrative Law Judge as the Presiding Officer. The Chief Administrative Law Judge shall then make the assignment.

(ii) If all parties to such a hearing waive in writing their statutory right to have an Administrative Law Judge named as the Presiding Officer in a hearing subject to this subparagraph the Regional Administrator may name a Presiding Officer under paragraph (a)(2)(ii) of this section.

(2) Before giving notice of a hearing under this subpart in a proceeding which does not involve an NPDES permit or a RCRA permit termination, the Regional Administrator shall either:

(i) Request that the Chief Administrative Law Judge assign an Administrative Law Judge as the Presiding Officer. The Chief Administrative Law Judge may thereupon make such an assignment if he concludes that the other duties of his office allow, or

(ii) Name a lawyer permanently or temporarily employed by the Agency and without prior connection with the proceeding to serve as Presiding Officer;

(iii) If the Chief Administrative Law Judge declines to name an Administrative Law Judge as Presiding Officer upon receiving a request under paragraph (a)(2)(i) of this section, the Regional Administrator shall name a Presiding Officer under paragraph (a)(2)(ii) of this section.

(b) It shall be the duty of the Presiding Officer to conduct a fair and impartial hearing. The Presiding Officer shall have the authority:

(1) Conferred by § 124.85(b)(1)-(15), § 124.83 (b) and (c), and;

(2) To receive relevant evidence, provided that all comments under §§ 124.113 and 124.118, the record of the panel hearing under § 124.120, and the administrative record, as defined in § 124.9 or in § 124.18 as the case may be shall be received in evidence, and

(3) Either upon motion or *sua sponte*, to change the date of the hearing under § 124.120, or to recess such a hearing until a future date. In any such case the notice required by § 124.10 shall be given.

(c) Whenever a panel hearing will be held on an individual draft NPDES permit for a source which does not have an existing permit, the Presiding Officer, on motion by the source, may issue an order authorizing it to begin discharging if it complies with all conditions of the draft permit or such other conditions as may be imposed by the Presiding Officer in consultation with the panel. The motion shall be granted if no party opposes it, or if the source demonstrates that:

(1) It is likely to receive a permit to discharge at that site;

(2) The environment will not be irreparably harmed if the source is allowed to begin discharging in compliance with the conditions of the Presiding Officer's order pending final agency action; and

(3) Its discharge pending final agency action is in the public interest.

(d) If for any offshore or coastal mobile exploratory drilling rig or coastal mobile developmental drilling rig which has never received a finally effective permit to discharge at a "site," but which is not a "new discharger" or "new source," the Regional Administrator finds that compliance with certain permit conditions may be necessary to avoid irreparable environmental harm during the nonadversary panel procedures, he may specify in the statement of basis or fact sheet that those conditions, even if contested, shall remain enforceable obligations of the discharger during administrative review unless otherwise modified by the Presiding Officer under paragraph (c) of this section.

(Clean Water Act (33 U.S.C. 1251 *et seq.*), Safe Drinking Water Act (42 U.S.C. 300f *et seq.*), Clean Air Act (42 U.S.C. 7401 *et seq.*), Resource Conservation and Recovery Act (42 U.S.C. 6901 *et seq.*))

[48 FR 14264, Apr. 1, 1983, as amended at 48 FR 39620, Sept. 1, 1983]

§ 124.120 Panel hearing.

(a) A Presiding Officer shall preside at each hearing held under this subpart. An EPA panel shall also take part in the hearing. The panel shall consist of three or more EPA temporary or permanent employees having special expertise or responsibility in areas related to the hearing issue, none of whom shall have taken part in formulating the draft permit. If appropriate for the evaluation of new or different issues presented at the hearing, the panel membership, at the discretion of the Regional Administrator, may change or may include persons not employed by EPA.

(b) At the time of the hearing notice under § 124.116, the Regional Administrator shall designate the persons who shall serve as panel members for the hearing and the Regional Administrator shall file with the Regional Hearing Clerk the name and address of each person so designated. The Regional Administrator may also designate EPA employees who will provide staff support to the panel but who may or may not serve as panel members. The designated persons shall be subject to the *ex parte* rules in § 124.78. The Regional Administrator may also designate Agency trial staff as defined in § 124.78 for the hearing.

(c) At any time before the close of the hearing the Presiding Officer, after consultation with the panel, may request that any person having knowledge concerning the issues raised in the hearing and not then scheduled to participate therein appear and testify at the hearing.

(d) The panel members may question any person participating in the panel hearing. Cross-examination by persons other than panel members shall not be permitted at this stage of the proceeding except when the Presiding Officer determines, after consultation with the panel, that the cross-examination would expedite consideration of the issues. However, the parties may submit written questions to the Presiding Officer for the Presiding Officer to ask the participants, and the Presiding Officer may, after consultation with the panel, and at his or her sole discretion, ask these questions.

(e) At any time before the close of the hearing, any party may submit to the Presiding Officer written questions specifically directed to any person appearing or testifying in the hearing. The Presiding Officer, after consultation with the panel may, at his sole discretion, ask the written question so submitted.

(f) Within 10 days after the close of the hearing, any party shall submit such additional written testimony, affidavits, information, or material as they consider relevant or which the panel may request. These additional submissions shall be filed with the Regional Hearing Clerk and shall be a part of the hearing record.

[48 FR 14264, Apr. 1, 1983, as amended at 49 FR 38052, Sept. 26, 1984]

§ 124.121 Opportunity for cross-examination.

(a) Any party to a panel hearing may submit a written request to cross-examine any issue of material fact. The motion shall be submitted to the Presiding Officer within 15 days after a full transcript of the panel hearing is filed with the Regional Hearing Clerk and shall specify:

(1) The disputed issue(s) of material fact. This shall include an explanation of why the questions at issue are factual, the extent to which they are in dispute in light of the then existing record, and the extent to which they are material to the decision on the application; and

(2) The person(s) to be cross-examined, and an estimate of the time nec-

best copy available

essary to conduct the cross-examination. This shall include a statement explaining how the cross-examination will resolve the disputed issues of material fact.

(b) After receipt of all motions for cross-examination under paragraph (a) of this section, the Presiding Officer, after consultation with the hearing panel, shall promptly issue an order either granting or denying each request. No cross-examination shall be allowed on questions of policy except to the extent required to disclose the factual basis for permit requirements, or on questions of law, or regarding matters (such as the validity of effluent limitations guidelines) that are not subject to challenge in permit issuance proceedings. Orders granting requests for cross-examination shall be served on all parties and shall specify:

(1) The issues on which cross-examination is granted;

(2) The persons to be cross-examined on each issue;

(3) The persons allowed to conduct cross-examination;

(4) Time limits for the examination of witnesses by each cross-examiner; and

(5) The date, time, and place of the supplementary hearing at which cross-examination shall take place.

(6) In issuing this order, the Presiding Officer may determine that two or more parties have the same or similar interests and that to prevent unduly repetitious cross-examination, they should be required to choose a single representative for purposes of cross-examination. In that case, the order shall simply assign time for cross-examination without further identifying the representative. If the designated parties fail to choose a single representative, the Presiding Officer may divide the assigned time among the representatives or issue any other order which justice may require.

(c) [Reserved]

(d) The Presiding Officer and, to the extent possible, the members of the hearing panel shall be present at the supplementary hearing. During the course of the hearing, the Presiding Officer shall have authority to modify any order issued under paragraph (b) of this section. A record will be made under § 124.87.

(e)(1) No later than the time set for requesting cross-examination, a party may request that alternative methods of clarifying the record (such as the submission of additional written information) be used in lieu of or in addition to cross-examination. The Presiding Officer shall issue an order granting or denying this request at the time he or she issues (or would have issued) an order granting or denying a request for cross-examination, under paragraph (b) of this section. If the request for an alternative method is granted, the order shall specify the alternative and any other relevant information (such as the due date for submitting written information).

(2) In passing on any request for cross-examination submitted under paragraph (a) of this section, the Presiding Officer may, as a precondition to ruling on the merits of the request, require alternative means of clarifying the record to be used whether or not a request to do so has been made. The party requesting cross-examination shall have one week to comment on the results of using the alternative method. After considering these comments the Presiding Officer shall issue an order granting or denying the request for cross-examination.

(f) The provisions of §§ 124.85(d)(2) and 124.84(e) apply to proceedings under this subpart.

[48 FR 14264, Apr. 1, 1983, as amended at 49 FR 38052, Sept. 26, 1984]

§ 124.122 Record for final permit.

The record on which the final permit shall be based in any proceeding under this subpart consists of:

(a) The administrative record compiled under § 124.9 or § 124.18 as the case may be;

(b) Any material submitted under § 124.78 relating to *ex parte* contacts;

(c) All notices issued under § 124.113;

(d) All requests for hearings, and rulings on those requests, received or issued under § 124.114;

(e) Any notice of hearing issued under § 124.116;

(f) Any request to participate in the hearing received under § 124.117;

(g) All comments submitted under § 124.118, any motions made under that section and the rulings on them, and any comments filed under § 124.113;

(h) The full transcript and other material received into the record of the panel hearing under § 124.120;

(i) Any motions for, or rulings on, cross-examination filed or issued under § 124.121;

(j) Any motions for, orders for, and the results of, any alternatives to cross-examination under § 124.121; and

(k) The full transcript of any cross-examination held.

§ 124.123 Filing of brief, proposed findings of fact and conclusions of law and proposed modified permit.

Unless otherwise ordered by the Presiding Officer, each party may, within 20 days after all requests for cross-examination are denied or after a transcript of the full hearing including any cross-examination becomes available, submit proposed findings of fact; conclusions regarding material issues of law, fact, or discretion; a proposed modified permit (if such person is urging that the draft or final permit be modified); and a brief in support thereof; together with references to relevant pages of transcript and to relevant exhibits. Within 10 days thereafter each party may file a reply brief concerning matters contained in opposing briefs and containing alternative findings of fact; conclusions regarding material issues of law, fact, or discretion; and a proposed modified permit where appropriate. Oral argument may be held at the discretion of the Presiding Officer on motion of any party or *sua sponte*.

§ 124.124 Recommended decision.

The person named to prepare the decision shall, as soon as practicable after the conclusion of the hearing, evaluate the record of the hearing and prepare and file a recommended decision with the Regional Hearing Clerk. That person may consult with, and receive assistance from, any member of the hearing panel in drafting the recommended decision, and may delegate the preparation of the recommended decision to the panel or to any member or members of it. This decision shall contain findings of fact, conclusions regarding all material issues of law, and a recommendation as to whether and in what respect the draft or final permit should be modified. After the recommended decision has been filed, the Regional Hearing Clerk shall serve a copy of that decision on each party and upon the Administrator.

§ 124.125 Appeal from or review of recommended decision.

(a)(1) Within 30 days after service of the recommended decision, any party may take exception to any matter set forth in that decision or to any adverse order or ruling of the Presiding Officer to which that party objected, and may appeal those exceptions to the Administrator as provided in § 124.91, except that references to "initial decision" will mean recommended decision under § 124.124.

§ 124.126 Final decision.

As soon as practicable after all appeal proceedings have been completed, the Administrator shall issue a final decision. That final decision shall include findings of fact; conclusions regarding material issue of law, fact, or discretion, as well as reasons therefore; and a modified permit to the extent appropriate. It may accept or reject all or part of the recommended decision. The Administrator may delegate some or all of the work of preparing this decision to a person or persons without substantial prior connection with the matter. The Administrator or his or her designee may consult with the Presiding Officer, members of the hearing panel, or any other EPA employee other than members of the Agency Trial Staff under § 124.78 in preparing the final decision. The Hearing Clerk shall file a copy of the decision on all parties.

§ 124.127 Final decision if there is no review.

If no party appeals a recommended decision to the Administrator, and if the Administrator does not elect to review it, the recommended decision becomes the final decision of the

Agency upon the expiration of the time for filing any appeals.

§ 124.128 Delegation of authority; time limitations.

(a) The Administrator may delegate to a Judicial Officer any or all of his or her authority under this subpart.

(b) The failure of the Administrator, Regional Administrator, or Presiding Officer to do any act within the time periods specified under this part shall not waive or diminish any right, power, or authority of the United States Environmental Protection Agency.

(c) Upon a showing by any party that it has been prejudiced by a failure of the Administrator, Regional Administrator, or Presiding Officer to do any act within the time periods specified under this part the Administrator, Regional Administrator, or Presiding Officer, as the case may be, may grant that party such relief of a procedural nature (including extension of any time for compliance or other action) as may be appropriate.

APPENDIX A TO PART 124—GUIDE TO DECISIONMAKING UNDER PART 124

This appendix is designed to assist in reading the procedural requirements set out in Part 124. It consists of two flow charts.

Figure 1 diagrams the more conventional sequence of procedures EPA expects to follow in processing permits under this Part. It outlines how a permit will be applied for, how a draft permit will be prepared and publicly noticed for comment, and how a final permit will be issued under the procedures in Subpart A.

This permit may then be appealed to the Administrator, as specified both in Subpart A (for RCRA, UIC, or PSD permits), or Subpart E or F (for NPDES permits). The first flow chart also briefly outlines which permit decisions are elgible for which types of appeal.

Part 124 also contains special "non-adversary panel hearing" procedures based on the "initial licensing" provisions of the Administrative Procedure Act. These procedures are set forth in Subpart F. In some cases, EPA may only decide to make those procedures applicable after it has gone through the normal Subpart A procedures on a draft permit. This process is also diagrammed in Figure 1.

Figure 2 sets forth the general procedure to be followed where these Subpart F procedures have been made applicable to a permit from the beginning.

Both flow charts outline a sequence of events directed by arrows. The boxes set forth elements of the permit process; and the diamonds indicate key decisionmaking points in the permit process.

The charts are discussed in more detail below.

Figure 1—Conventional EPA Permitting Procedures

This chart outlines the procedures for issuing permits whenever EPA does not make use of the special "panel hearing" procedures in Subpart F. The major steps depicted on this chart are as follows:

1. The permit process can begin in any one of the following ways:

a. Normally, the process will begin when a person applies for a permit under §§ 122.21 (NPDES), 144.31 (UIC), 233.4 (404), and 270.10 (RCRA) and 124.3.

b. In other cases, EPA may decide to take action on its own initiative to change a permit or to issue a general permit. This leads directly to preparation of a draft permit under § 124.6.

c. In addition, the permittee or any interested person (other than for PSD permits) may request modificiation, revocation and reissuance or termination of a permit under §§ 122.62, 122.64 (NPDES), 144.39, 144.40 (UIC), 233.14, 233.15, (404), 270.41, 270.43 (RCRA), and 124.5.

Those requests can be handled in either of two ways:

i. EPA may tentatively decide to grant the request and issue a new draft permit for public comment, either with or without requiring a new application.

ii. If the request is denied, an informal appeal to the Administrator is available.

2. The next major step in the permit process is the preparation of a draft permit. As the chart indicates, preparing a draft permit also requires preparation of either a statement of basis (§ 124.7), a fact sheet (§ 124.5) or, compilation of an "administrative record" (§ 124.9), and public notice (§ 124.10).

3. The next stage is the public comment period (§ 124.11). A public hearing under § 124.12 may be requested before the close of the public comment period.

EPA has the discretion to hold a public hearing, even if there were no requests during the public comment period. If EPA decides to schedule one, the public comment period will be extended through the close of the hearing. EPA also has the discretion to conduct the public hearing under Subpart F panel procedures. (See Figure 2.)

The regulations provide that all arguments and factual materials that a person wishes EPA to consider in connection with a particular permit must be placed in the record by the close of the public comment period (§ 124.13).

4. Section 124.14 states that EPA, at any time before issuing a final permit decision may decide to either reopen or extend the comment period, prepare a new draft permit and begin the process again from that point, or for RCRA and UIC permits, or for NPDES permits that constitute "initial licensing", to begin "panel hearing" proceedings under Subpart F. These various results are shown schematically.

5. The public comment period and any public hearing will be followed by issuance of a final permit decision (§ 124.15). As the chart shows, the final permit must be accompanied by a response to comments (§ 124.17) and be based on the administrative record (§ 124.18).

6. After the final permit is issued, it may be appealed to higher agency authority. The exact form of the appeal depends on the type of permit involved.

a. RCRA, UIC or PSD permits standing alone will be appealed directly to the Administrator under § 124.19.

b. NPDES permits which do not involve "initial licensing" may be appealed in an evidentiary hearing under Subpart E. The regulations provide (§ 124.74) that if such a hearing is granted for an NPDES permit and if RCRA or UIC permits have been consolidated with that permit under § 124.4 then closely related conditions of those RCRA or UIC permits may be reexamined in an evidentiary hearing. PSD permits, however, may never be reexamined in a Subpart E hearing.

c. NPDES permits which do involve "initial licensing" may be appealed in a panel hearing under Subpart F. The regulations provide that if such a hearing is granted for an NPDES permit, consolidated RCRA, UIC, or PSD permits may also be reexamined in the same proceeding.

As discussed below, this is only one of several ways the panel hearing procedures may be used under these regulations.

7. This chart does not show EPA appeal procedures in detail. Procedures for appeal to the Administrator under § 124.19 are self-explanatory; Subpart F procedures are diagrammed in Figure 2; and Subpart E procedures are basically the same that would apply in any evidentiary hearing.

However, the chart at this stage does reflect the provisions of § 124.60(b), which allows EPA, even after a formal hearing has begun, to "recycle" a permit back to the draft permit stage at any time before that hearing has resulted in an initial decision.

Figure 2—Non-Adversary Panel Procedures

This chart outlines the procedures for processing permits under the special "panel hearing" procedures of Subpart F. These procedures were designed for making decisions that involve "initial licensing" NPDES permits. Those permits include the first decisions on an NPDES permit applied for by any discharger that has not previously held one, and the first decision on any statutory variance. In addition, these procedures will be used for any RCRA, UIC, or PSD permit which has been consolidated with such an NPDES permit, and may be used, if the Regional Administrator so chooses, for the issuance of individual RCRA or UIC permits. The steps depicted on this chart are as follows:

1. *Application for a permit.* These proceedings will generally begin with an application, since NPDES initial licensing always will begin with an application.

2. *Preparation of a draft permit.* This is identical to the similar step in Figure 1.

3. *Public comment period.* This again is identical to the similar step in Figure 1. The Regional Administrator has the opportunity to schedule an informal public hearing under § 124.12 during this period.

4. Requests for a panel hearing must be received by the end of the public comment period under § 124.113. See § 124.114.

If a hearing request is denied, or if no hearing requests are received, a recommended decision will be issued based on the comments received. The recommended decision may then be appealed to the Administrator. See § 124.115.

5. If a hearing is granted, notice of the hearing will be published in accordance with § 124.116 and will be followed by a second comment period during which requests to participate and the bulk of the remaining evidence for the final decision will be received (§§ 124.117 and 124.118).

The regulations also allow EPA to move directly to this stage by scheduling a hearing when the draft permit is prepared. In such cases the comment period on the draft permit under § 124.113 and the prehearing comment period under § 124.118 would occur at the same time. EPA anticipates that this will be the more frequent practice when permits are processed under panel procedures.

This is also a stage at which EPA can

switch from the conventional procedures diagramed in Figure 1 to the panel hearing procedures. As the chart indicates, EPA would do this by scheduling a panel hearing either through use of the "recycle" provision in § 124.14 or in response to a request for a formal hearing under § 124.74.

6. After the close of the comment period, a panel hearing will be held under § 124.120, followed by any cross-examination granted under § 124.121. The recommended decision will then be prepared (§ 124.124) and an opportunity for appeal provided under § 124.125. A final decision will be issued after appeal proceedings, if any, are concluded.

Figure 1-Conventional EPA Permitting Procedures

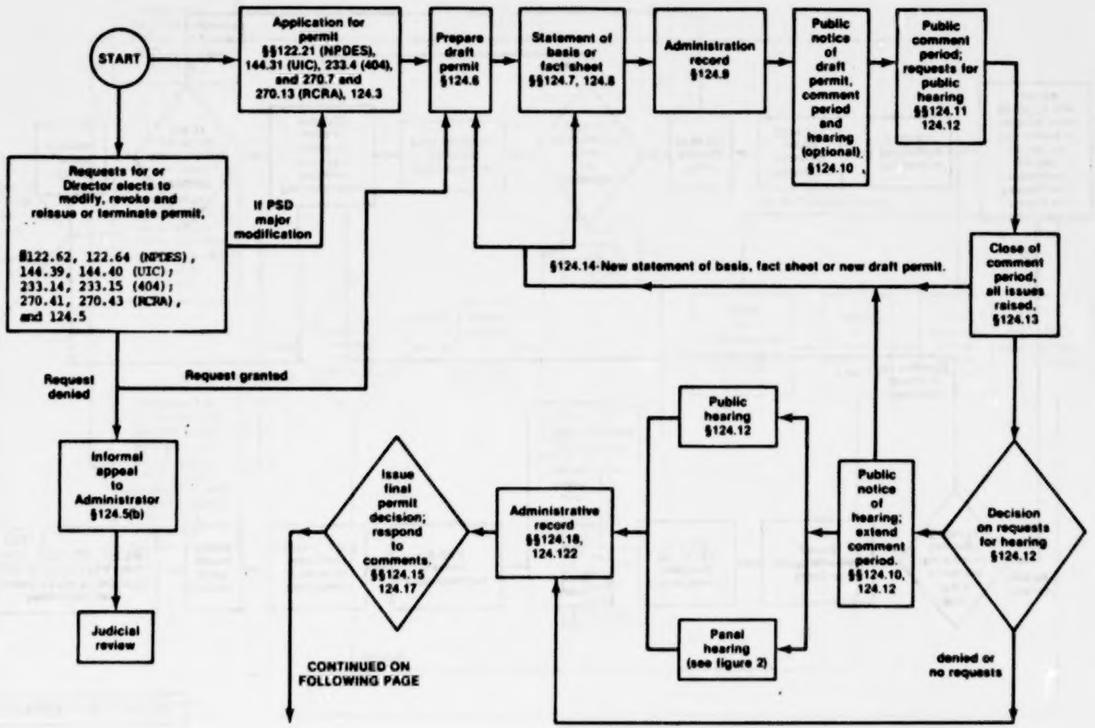
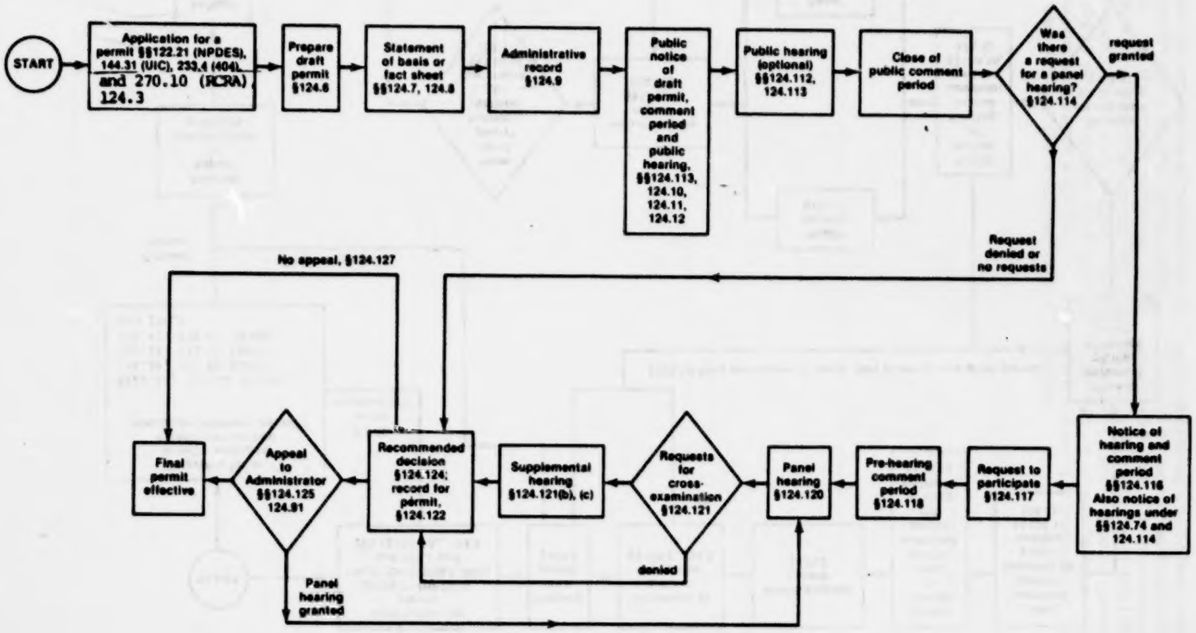
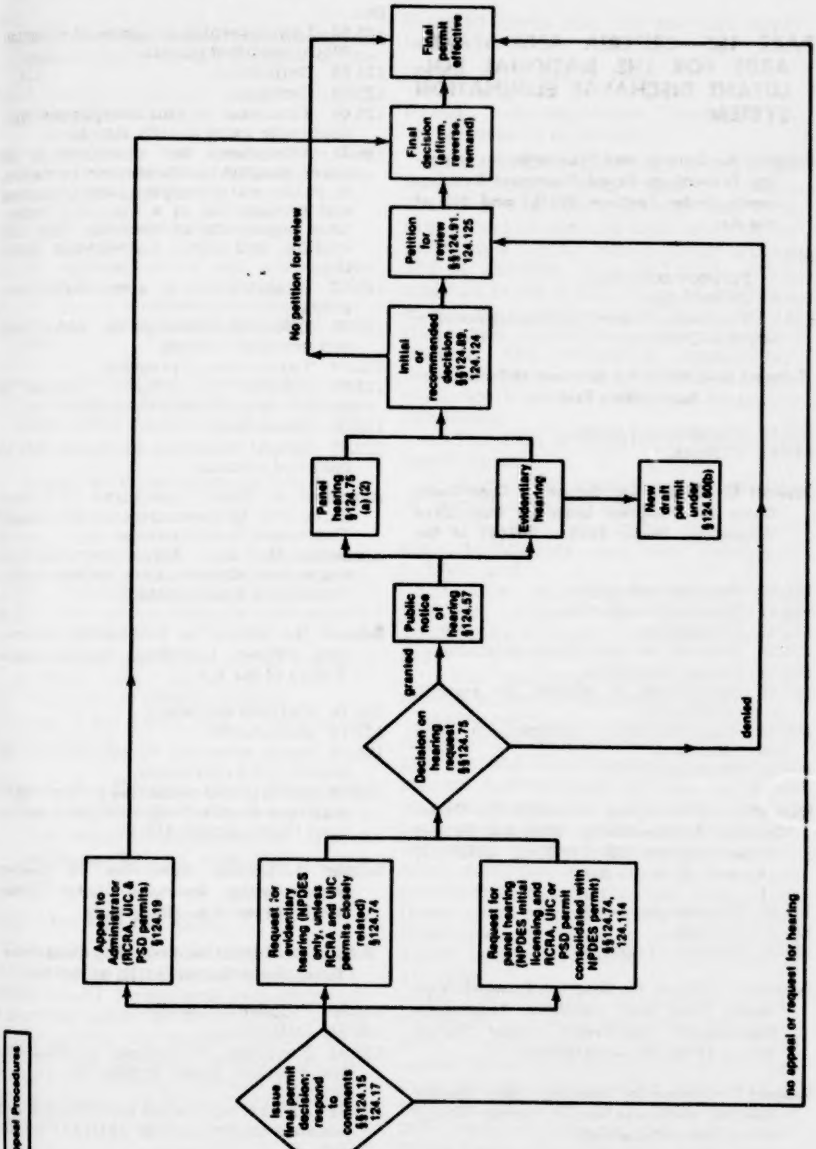

START
Application for permit §§122.21 (NPDES), 144.31 (UIC), 233.4 (404), and 270.7 and 270.13 (RCRA), 124.3
Prepare draft permit §124.6
Statement of basis or fact sheet §§124.7, 124.8
Administration record §124.9
Public notice of draft permit, comment period and hearing (optional). §124.10
Public comment period; requests for public hearing §§124.11 124.12
Requests for or Director elects to modify, revoke and reissue or terminate permit,
§122.62, 122.64 (NPDES), 144.39, 144.40 (UIC); 233.14, 233.15 (404); 270.41, 270.43 (RCRA), and 124.5
If PSD major modification
§124.14-New statement of basis, fact sheet or new draft permit.
Close of comment period, all issues raised, §124.13
Request denied
Request granted
Public hearing §124.12
Informal appeal to Administrator §124.5(b)
Issue final permit decision; respond to comments. §§124.15 124.17
Administrative record §§124.18, 124.122
Public notice of hearing; extend comment period. §§124.10, 124.12
Decision on requests for hearing §124.12
Judicial review
CONTINUED ON FOLLOWING PAGE
Panel hearing (see figure 2)
denied or no requests

Figure 2-Non-Adversary Panel Procedures


START
Application for a permit §§122.21 (NPDES), 144.31 (UIC), 233.4 (404), and 270.10 (RCRA) 124.3
Prepare draft permit §124.6
Statement of basis or fact sheet §§124.7, 124.8
Administrative record §124.9
Public notice of draft permit, comment period and public hearing, §§124.113, 124.10, 124.11, 124.12
Public hearing (optional) §§124.112, 124.113
Close of public comment period
Was there a request for a panel hearing? §124.114
request granted
Request denied or no requests
Notice of hearing and comment period §§124.116 Also notice of hearings under §§124.74 and 124.114
Request to participate §124.117
Pre-hearing comment period §124.118
Panel hearing §124.120
Requests for cross-examination §124.121
denied
Supplemental hearing §124.121(b), (c)
Recommended decision §124.124; record for permit, §124.122
No appeal, §124.127
Appeal to Administrator §§124.125 124.91
Panel hearing granted
Final permit effective


EPA Appeal Procedures
Issue final permit decision; respond to comments §§124.15 124.17
Appeal to Administrator (RCRA, UIC & PSD permits) §124.19
Request for evidentiary hearing (NPDES only, unless RCRA and UIC permits closely related) §124.74
Request for panel hearing (NPDES initial licensing and RCRA, UIC or PSD permit consolidated with NPDES permit) §§124.74, 124.114
Decision on hearing request §§124.75
granted
denied
Public notice of hearing §124.57
Panel hearing §124.75 (a) (2)
Evidentiary hearing
New draft permit under §124.60(b)
Initial or recommended decision §§124.89, 124.124
No petition for review
Petition for review §§124.91, 124.125
Final decision (affirm, reverse, remand)
Final permit effective
no appeal or request for hearing

PART 125—CRITERIA AND STANDARDS FOR THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Subpart A—Criteria and Standards for Imposing Technology-Based Treatment Requirements Under Sections 301(b) and 402 of the Act

Sec.

125.1 Purpose and scope.
125.2 Definitions.
125.3 Technology-based treatment requirements in permits.

Subpart B—Criteria for Issuance of Permits to Aquaculture Projects

125.10 Purpose and scope.
125.11 Criteria.

Subpart C—Criteria for Extending Compliance Dates for Facilities Installing Innovative Technology Under Section 301(k) of the Act

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125.21 Statutory authority.
125.22 Definitions.
125.23 Request for compliance extension.
125.24 Permit conditions.
125.25 Signatories to request for compliance extension.
125.26 Supplementary information and recordkeeping.
125.27 Procedures.

Subpart D—Criteria and Standards for Determining Fundamentally Different Factors Under Sections 301(b)(1)(A), 301(b)(2)(A) and (E) of the Act

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125.32 Method of application.

Subpart E—Criteria for Granting Economic Variances From Best Available Technology Economically Achievable Under Section 301(c) of the Act—[Reserved]

Subpart F—Criteria for Granting Water Quality Related Variances Under Section 301(g) of the Act—[Reserved]

Subpart G—Criteria for Modifying the Secondary Treatment Requirements Under Section 301(h) of the Clean Water Act

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Sec.

125.57 Law governing issuance of a section 301(h) modified permit.
125.58 Definitions.
125.59 General.
125.60 Existence of and compliance with applicable water quality standards.
125.61 Attainment or maintenance of water quality which assures protection of public water supplies, the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife, and allows recreational activities.
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APPENDIX A—SMALL APPLICANT QUESTIONNAIRE FOR MODIFICATION OF SECONDARY TREATMENT REQUIREMENTS
APPENDIX B—LARGE APPLICANT QUESTIONNAIRE FOR MODIFICATION OF SECONDARY TREATMENT REQUIREMENTS

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125.71 Definitions.
125.72 Early screening of applications for section 316(a) variances.
125.73 Criteria and standards for the determination of alternative effluent limitations under section 316(a).

Subpart I—Criteria Applicable To Cooling Water Intake Structures Under Section 316(b) of the Act—[Reserved]

Subpart J—Criteria for Extending Compliance Dates Under Section 301(i) of the Act

125.90 Purpose and scope.
125.91 Definition.
125.92 Requests for permit modification and issuance under section 301(i)(1) of the Act.
125.93 Criteria for permit modification and issuance under section 301(i)(1) of the Act.
125.94 Permit terms and conditions under section 301(i)(1) of the Act.
125.95 Requests for permit modification or issuance under section 301(i)(2) of the Act.

ec.
25.96 Criteria for permit modification or issuance under section 301(i)(2) of the Act.
25.97 Permit terms and conditions under section 301(i)(2) of the Act.

bpart K—Criteria and Standards for Best Management Practices Authorized Under Section 304(e) of the Act

5.100 Purpose and scope.
5.101 Definition.
5.102 Applicability of best management practices.
5.103 Permit terms and conditions.
5.104 Best management practices programs.

bpart L—Criteria and Standards for Imposing Conditions for the Disposal of Sewage Sludge Under Section 405 of the Act—[Reserved]

Subpart M—Ocean Discharge Criteria

5.120 Scope and purpose.
5.121 Definitions.
5.122 Determination of unreasonable degradation of the marine environment.
5.123 Permit requirements.
5.124 Information required to be submitted by applicant.

UTHORITY: Clean Water Act, as amended the Clean Water Act of 1977, 33 U.S.C. 51 *et seq.*, unless otherwise noted.

OURCE: 44 FR 32948, June 7, 1979, unless herwise noted.

bpart A—Criteria and Standards for Imposing Technology-Based Treatment Requirements Under Sections 301(b) and 402 of the Act

25.1 Purpose and scope.

This subpart establishes criteria and ndards for the imposition of techlogy-based treatment requirements permits under section 301(b) of the t, including the application of EPA omulgated effluent limitations and se-by-case determinations of effluent limitations under section 402(a)(1) the Act.

25.2 Definitions.

For the purposes of this part, any ference to "the Act" shall mean the ean Water Act of 1977 (CWA). nless otherwise noted, the definitions in Parts 122, 123 and 124 apply to this part.

[45 FR 33512, May 19, 1980]

§ 125.3 Technology-based treatment requirements in permits.

(a) *General.* Technology-based treatment requirements under section 301(b) of the Act represent the minimum level of control that must be imposed in a permit issued under section 402 of the Act. (See §§ 122.41, 122.42 and 122.44 for a discussion of additional or more stringent effluent limitations and conditions.) Permits shall contain the following technology-based treatment requirements in accordance with the following statutory deadlines;

(1) For POTW's, effluent limitations based upon:

(i) Secondary treatment—from date of permit issuance; and

(ii) The best practicable waste treatment technology—not later than July 1, 1983; and

(2) For dischargers other than POTWs except as provided in § 122.29(d), effluent limitations requiring:

(i) The best practicable control technology currently available (BPT)—

(A) For effluent limitations promulgated under Section 304(b) after January 1, 1982 and requiring a level of control substantially greater or based on fundamentally different control technology than under permits for an industrial category issued before such date, compliance as expeditiously as practicable but in no case later than three years after the date such limitations are promulgated under section 304(b) and in no case later than March 31, 1989;

(B) For effluent limitations established on a case-by-case basis based on Best Professional Judgment (BPJ) under Section 402(a)(1)(B) of the Act in a permit issued after February 4, 1987, compliance as expeditiously as practicable but in no case later than three years after the date such limitations are established and in no case later than March 31, 1989;

(C) For all other BPT effluent limitations compliance is required from the date of permit issuance.

(ii) For conventional pollutants, the best conventional pollutant control technology (BCT)—

(A) For effluent limitations promulgated under Section 304(b), as expeditiously as practicable but in no case later than three years after the date such limitations are promulgated under section 304(b), and in no case later than March 31, 1989.

(B) For effluent limitations established on a case-by-case (BPJ) basis under Section 402(a)(1)(B) of the Act in a permit issued after February 4, 1987, compliance as expeditiously as practicable but in no case later than three years after the date such limitations are established and in no case later than March 31, 1989;

(iii) For all toxic pollutants referred to in Committee Print No. 95-30, House Committee on Public Works and Transportation, the best available technology economically achievable (BAT)—

(A) For effluent limitations established under Section 304(b), as expeditiously as practicable but in no case later than three years after the date such limitations are promulgated under section 304(b), and in no case later than March 31, 1989.

(B) For permits issued on a case-by-case (BPJ) basis under section 402(a)(1)(B) of the Act after February 4, 1987 establishing BAT effluent limitations, compliance is required as expeditiously as practicable but in no case later than three years after the date such limitations are promulgated under section 304(b), and in no case later than March 31, 1989.

(iv) For all toxic pollutants other than those listed in Committee Print No. 95-30, effluent limitations based on BAT—

(A) For effluent limitations promulgated under Section 304(b) compliance is required as expeditiously as practicable, but in no case later than three years after the date such limitations are promulgated under section 304(b) and in no case later than March 31, 1989.

(B) For permits issued on a case-by-case (BPJ) basis under Section 402(a)(1)(B) of the Act after February 4, 1987 establishing BAT effluent limitations, compliance is required as expeditiously as practicable but in case later than 3 years after the da such limitations are established and no case later than March 31, 1989.

(v) For all pollutants which are n ther toxic nor conventional pollutan effluent limitations based on BAT—

(A) For effluent limitations prom gated under section 304(b), compliar is required as expeditiously as prac cable but in no case later than 3 ye after the date such limitations are tablished and in no case later th March 31, 1989.

(B) For permits issued on a case- case (BPJ) basis under Secti 402(a)(1)(B) of the Act after Febru 4, 1987 establishing BAT effluent li tations compliance is required as ex ditiously as practicable but in no c later than three years after the d such limitations are established and no case later than March 31, 1989.

(b) *Statutory variances and ext sions.* (1) The following varian from technology-based treatment quirements are authorized by the and may be applied for under § 122

(i) For POTW's, a section 301 marine discharge variance from s ondary treatment (Subpart G);

(ii) For dischargers other th POTW's;

(A) A section 301(c) economic va ance from BAT (Subpart E);

(B) A section 301(g) water quality lated variance from BAT (Subpart and

(C) A section 316(a) thermal va ance from BPT, BCT and BAT (S part H).

(2) The following extensions of de lines for compliance with technolo based treatment requirements are thorized by the Act and may be plied for under § 124.53:

(i) For POTW's a section 301(i) tension of the secondary treatm deadline (Subpart J);

(ii) For dischargers other th POTW's:

(A) A section 301(i) extension of BPT deadline (Subpart J); and

(B) A section 301(k) extension of BAT deadline (Subpart C).

(c) *Methods of imposing technolo based treatment requirements in mits.* Technology-based treatment quirements may be imposed through one of the following three methods:

(1) Application of EPA-promulgated effluent limitations developed under section 304 of the Act to dischargers by category or subcategory. These effluent limitations are not applicable to the extent that they have been remanded or withdrawn. However, in the case of a court remand, determinations underlying effluent limitations shall be binding in permit issuance proceedings where those determinations are not required to be reexamined by a court remanding the regulations. In addition, dischargers may seek fundamentally different factors variances from these effluent limitations under § 122.21 and Subpart D of this part.

(2) On a case-by-case basis under section 402(a)(1) of the Act, to the extent that EPA-promulgated effluent limitations are inapplicable. The permit writer shall apply the appropriate factors listed in § 125.3(d) and shall consider:

(i) The appropriate technology for the category or class of point sources of which the applicant is a member, based upon all available information; and

(ii) Any unique factors relating to the applicant.

[*Comment:* These factors must be considered in all cases, regardless of whether the permit is being issued by EPA or an approved State.]

(3) Through a combination of the methods in paragraphs (d) (1) and (2) of this section. Where promulgated effluent limitations guidelines only apply to certain aspects of the discharger's operation, or to certain pollutants, other aspects or activities are subject to regulation on a case-by-case basis in order to carry out the provisions of the Act.

(4) Limitations developed under paragraph (d)(2) of this section may be expressed, where appropriate, in terms of toxicity (e.g., "the LC_{50} for fat head minnow of the effluent from outfall 001 shall be greater than 25%"). *Provided,* That is shown that the limits reflect the appropriate requirements (for example, technology-based or water-quality-based standards) of the Act.

(d) In setting case-by-case limitations pursuant to § 125.3(c), the permit writer must consider the following factors:

(1) *For BPT requirements:* (i) The total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application;

(ii) The age of equipment and facilities involved;

(iii) The process employed;

(iv) The engineering aspects of the application of various types of control techniques;

(v) Process changes; and

(vi) Non-water quality environmental impact (including energy requirements).

(2) *For BCT requirements:* (i) The reasonableness of the relationship between the costs of attaining a reduction in effluent and the effluent reduction benefits derived;

(ii) The comparison of the cost and level of reduction of such pollutants from the discharge from publicly owned treatment works to the cost and level of reduction of such pollutants from a class or category of industrial sources;

(iii) The age of equipment and facilities involved;

(iv) The process employed;

(v) The engineering aspects of the application of various types of control techniques;

(vi) Process changes; and

(vii) Non-water quality environmental impact (including energy requirements).

(3) *For BAT requirements:* (i) The age of equipment and facilities involved;

(ii) The process employed;

(iii) The engineering aspects of the application of various types of control techniques;

(iv) Process changes;

(v) The cost of achieving such effluent reduction; and

(vi) Non-water quality environmental impact (including energy requirements).

(e) Technology-based treatment requirements are applied prior to or at the point of discharge.

(f) Technology-based treatment requirements cannot be satisfied through the use of "non-treatment" techniques such as flow augmentation and in-stream mechanical aerators. However, these techniques may be considered as a method of achieving water quality standards on a case-by-case basis when:

(1) The technology-based treatment requirements applicable to the discharge are not sufficient to achieve the standards;

(2) The discharger agrees to waive any opportunity to request a variance under section 301 (c), (g) or (h) of the Act; and

(3) The discharger demonstrates that such a technique is the preferred environmental and economic method to achieve the standards after consideration of alternatives such as advanced waste treatment, recycle and reuse, land disposal, changes in operating methods, and other available methods.

(g) Technology-based effluent limitations shall be established under this subpart for solids, sludges, filter backwash, and other pollutants removed in the course of treatment or control of wastewaters in the same manner as for other pollutants.

(h)(1) The Director may set a permit limit for a conventional pollutant at a level more stringent than the best conventional pollution control technology (BCT), or a limit for a nonconventional pollutant which shall not be subject to modification under section 301 (c) or (g) of the Act where:

(i) Effluent limitations guidelines specify the pollutant as an indicator for a toxic pollutant, or

(ii)(A) The limitation reflects BAT-level control of discharges of one or more toxic pollutants which are present in the waste stream, and a specific BAT limitation upon the toxic pollutant(s) is not feasible for economic or technical reasons;

(B) The permit identifies which toxic pollutants are intended to be controlled by use of the limitation; and

(C) The fact sheet required by § 124.56 sets forth the basis for the limitation, including a finding that compliance with the limitation will result in BAT-level control of the toxic pollutant discharges identified in paragraph (h)(1)(ii)(B) of this section, and a finding that it would be economically or technically infeasible to directly limit the toxic pollutant(s).

(2) The Director may set a permit limit for a conventional pollutant at a level more stringent than BCT when:

(i) Effluent limitations guidelines specify the pollutant as an indicator for a hazardous substance, or

(ii)(A) The limitation reflects BAT-level control of discharges (or an appropriate level determined under section 301(c) or (g) of the Act) of one or more hazardous substance(s) which are present in the waste stream, and a specific BAT (or other appropriate) limitation upon the hazardous substance(s) is not feasible for economic or technical reasons;

(B) The permit identifies which hazardous substances are intended to be controlled by use of the limitation; and

(C) The fact sheet required by § 124.56 sets forth the basis for the limitation, including a finding that compliance with the limitations will result in BAT-level (or other appropriate level) control of the hazardous substances discharges identified in paragraph (h)(2)(ii)(B) of this section, and a finding that it would be economically or technically infeasible to directly limit the hazardous substance(s).

(iii) Hazardous substances which are also toxic pollutants are subject to paragraph (h)(1) of this section.

(3) The Director may not set a more stringent limit under the preceding paragraphs if the method of treatment required to comply with the limit differs from that which would be required if the toxic pollutant(s) or hazardous substance(s) controlled by the limit were limited directly.

(4) Toxic pollutants identified under paragraph (h)(1) of this section remain subject to the requirements of § 122.42(a)(1) (notification of increased discharges of toxic pollutants above levels reported in the application form).

(Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act: 42 U.S.C. 6905, 6912, 6925, 6927, 6974)

[44 FR 32948, June 7, 1979, as amended at 45 FR 33512, May 19, 1980; 48 FR 14293, Apr. 1, 1983; 49 FR 38052, Sept. 26, 1984; 50 FR 6941, Feb. 19, 1985; 54 FR 257, Jan. 4, 1989]

Subpart B—Criteria for Issuance of Permits to Aquaculture Projects

§ 125.10 Purpose and scope.

(a) These regulations establish guidelines under sections 318 and 402 of the Act for approval of any discharge of pollutants associated with an aquaculture project.

(b) The regulations authorize, on a selective basis, controlled discharges which would otherwise be unlawful under the Act in order to determine the feasibility of using pollutants to grow aquatic organisms which can be harvested and used beneficially. EPA policy is to encourage such projects, while at the same time protecting other beneficial uses of the waters.

(c) Permits issued for discharges into aquaculture projects under this subpart are NPDES permits and are subject to the applicable requirements of Parts 122, 123 and 124. Any permit shall include such conditions (including monitoring and reporting requirements) as are necessary to comply with those parts. Technology-based effluent limitations need not be applied to discharges into the approved project except with respect to toxic pollutants.

§ 125.11 Criteria.

(a) No NPDES permit shall be issued to an aquaculture project unless:

(1) The Director determines that the aquaculture project:

(i) Is intended by the project operator to produce a crop which has significant direct or indirect commercial value (or is intended to be operated for research into possible production of such a crop); and

(ii) Does not occupy a designated project area which is larger than can be economically operated for the crop under cultivation or than is necessary for research purposes.

(2) The applicant has demonstrated, to the satisfaction of the Director, that the use of the pollutant to be discharged to the aquaculture project will result in an increased harvest of organisms under culture over what would naturally occur in the area;

(3) The applicant has demonstrated, to the satisfaction of the Director, that if the species to be cultivated in the aquaculture project is not indigenous to the immediate geographical area, there will be minimal adverse effects on the flora and fauna indigenous to the area, and the total commercial value of the introduced species is at least equal to that of the displaced or affected indigenous flora and fauna;

(4) The Director determines that the crop will not have a significant potential for human health hazards resulting from its consumption;

(5) The Director determines that migration of pollutants from the designated project area to water outside of the aquaculture project will not cause or contribute to a violation of water quality standards or a violation of the applicable standards and limitations applicable to the supplier of the pollutant that would govern if the aquaculture project were itself a point source. The approval of an aquaculture project shall not result in the enlargement of a pre-existing mixing zone area beyond what had been designated by the State for the original discharge.

(b) No permit shall be issued for any aquaculture project in conflict with a plan or an amendment to a plan approved under section 208(b) of the Act.

(c) No permit shall be issued for any aquaculture project located in the territorial sea, the waters of the contiguous zone, or the oceans, except in conformity with guidelines issued under section 403(c) of the Act.

(d) Designated project areas shall not include a portion of a body of water large enough to expose a substantial portion of the indigenous biota to the conditions within the designated project area. For example, the designated project area shall not include the entire width of a watercourse, since all organisms indigenous to that watercourse might be subjected to discharges of pollutants that would, except for the provisions of section 318 of the Act, violate section 301 of the Act.

(e) Any modifications caused by the construction or creation of a reef, barrier or containment structure shall not unduly alter the tidal regimen of an estuary or interfere with migrations of unconfined aquatic species.

[*Comment:* Any modifications described in this paragraph which result in the discharge of dredged or fill material into navigable waters may be subject to the permit requirements of section 404 of the Act.]

(f) Any pollutants not required by or beneficial to the aquaculture crop shall not exceed applicable standards and limitations when entering the designated project area.

Subpart C—Criteria for Extending Compliance Dates for Facilities Installing Innovative Technology Under Section 301(k) of the Act

SOURCE: 49 FR 25981, June 25, 1984, unless otherwise noted.

§ 125.20 Purpose and scope.

This subpart establishes the criteria and procedures to be used in determining whether an industrial discharger will be granted a compliance extension for the installation of an innovative technology.

§ 125.21 Statutory authority.

Section 301(k) provides that the Administrator (or a State with an approved NPDES program, in consultation with the Administrator) may grant a compliance extension for BAT limitations to a discharger which installs an innovative technology. The innovative technology must produce either a significantly greater effluent reduction than that achieved by the best available technology economically achievable (BAT) or the same level of treatment as BAT at a significantly lower cost. The Administrator is authorized to grant compliance extensions to a date no later than 2 years after the date for compliance with the effluent limitation which would otherwise be applicable.

[54 FR 257, Jan. 4, 1989]

§ 125.22 Definitions.

(a) The term "innovative technology" means a production process, a pollution control technique, or a combination of the two which satisfies one of the criteria in § 125.23 and which has not been commercially demonstrated in the industry of which the requesting discharger is a part.

(b) The term "potential for industry-wide application" means that an innovative technology can be applied in two or more facilities which are in one or more industrial categories.

(c) The term "Significantly greater effluent reduction than BAT" means that the effluent reduction over BAT produced by an innovative technology is significant when compared to the effluent reduction over best practicable control technology currently available (BPT) produced by BAT.

(d) The term "significantly lower cost" means that an innovative technology must produce a significant cost advantage when compared to the technology used to achieve BAT limitations in terms of annual capital costs and annual operation and maintenance expenses over the useful life of the technology.

§ 125.23 Request for compliance extension.

The Director shall grant a compliance extension to a date no later than 2 years after the date for compliance with the effluent limitation which would otherwise be applicable, to a discharger that demonstrates:

(a) That the installation and operation of its proposed innovative technology at its facility will result in a significantly greater effluent reduction than BAT and has the potential for industry-wide application; or

(b) That the installation and operation of its proposed innovative technology at its facility will result in the same effluent reduction as BAT at a significantly lower cost and has the potential for industry-wide application.

[44 FR 32948, June 7, 1979, as amended at 54 FR 257, Jan. 4, 1989]

§ 125.24 Permit conditions.

The Director may include any of the following conditions in the permit of a discharger to which a compliance extension beyond the otherwise applicable compliance date is granted:

(a) A requirement that the discharger report annually on the installation, operation, and maintenance costs of the innovative technology;

(b) Alternative BAT limitations that the discharger must meet as soon as possible and not later than 2 years after the date for compliance with the effluent limitation which would otherwise be applicable if the innovative technology limitations that are more stringent than BAT are not achievable.

[49 FR 25981, June 25, 1984; 49 FR 28560, July 13, 1984, as amended at 54 FR 257, Jan. 4, 1989]

§ 125.25 Signatories to request for compliance extension.

(a) All section 301(k) requests must be signed in accordance with the provisions of 40 CFR 122.22.

(b) Any person signing a request under paragraph (a) of this section shall make the following certification:

> I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

(c) A professional engineer shall certify that the estimates by the applicant of the costs for the BAT control equipment and for the innovative technology are made in accordance with good engineering practice and represent, in his judgment, the best information available. The Director may waive the requirements for certification under this subsection if, in his opinion, the cost of such certification is unreasonable when compared to the annual sales of the applicant.

§ 125.26 Supplementary information and recordkeeping.

(a) In addition to the information submitted in support of the request, the applicant shall provide the Director, at his or her request, such other information as the Director may reasonably require to assess the performance of cost of the innovative technology.

(b) Applicants shall keep records of all data used to complete the request for a compliance extension for the life of the permit containing the compliance extension.

§ 125.27 Procedures.

(a) The procedure for requesting a section 301(k) compliance extension is contained in §§ 124.62 and 124.63. In addition, notwithstanding § 122.21(m)(4), the Director may accept applications for such extensions after the close of the public comment period on the permit if the applicant can show that information necessary to the development of the innovation was not available at the time the permit was written and that the innovative technology can be installed and operated in time to comply no later than 2 years after the date for compliance with the effluent limitation which would otherwise be applicable.

(b) The procedure for appealing a decision on a request for a compliance extension is contained in §§ 124.60 and 124.64.

(Approved by the Office of Management and Budget under the control number 2040-0066)

[49 FR 25981, June 25, 1984, as amended at 54 FR 257, Jan. 4, 1989]

Subpart D—Criteria and Standards for Determining Fundamentally Different Factors Under Sections 301(b)(1)(A), 301(b)(2) (A) and (E) of the Act

§ 125.30 Purpose and scope.

(a) This subpart establishes the criteria and standards to be used in determining whether effluent limitations alternative to those required by promulgated EPA effluent limitations guidelines under sections 301 and 304 of the Act (hereinafter referred to as "national limits") should be imposed on a discharger because factors relating to the discharger's facilities, equipment, processes or other factors related to the discharger are fundamentally different from the factors considered by EPA in development of the national limits. This subpart applies to all national limitations promulgated under sections 301 and 304 of the Act, except for the BPT limits contained in 40 CFR 423.12 (steam electric generating point source category).

(b) In establishing national limits, EPA takes into account all the information it can collect, develop and solicit regarding the factors listed in sections 304(b) and 304(g) of the Act. In some cases, however, data which could affect these national limits as they apply to a particular discharge may not be available or may not be considered during their development. As a result, it may be necessary on a case-by-case basis to adjust the national limits, and make them either more or less stringent as they apply to certain dischargers within an industrial category or subcategory. This will only be done if data specific to that discharger indicates it presents factors fundamentally different from those considered by EPA in developing the limit at issue. Any interested person believing that factors relating to a discharger's facilities, equipment, processes or other facilities related to the discharger are fundamentally different from the factors considered during development of the national limits may request a fundamentally different factors variance under § 122.21(l)(1). In addition, such a variance may be proposed by the Director in the draft permit.

(Secs. 301, 304, 306, 307, 308, and 501 of the Clean Water Act (the Federal Water Pollution Control Act Amendments of 1972, Pub. L. 92-500 as amended by the Clean Water Act of 1977, Pub. L. 95-217 (the "Act"); Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act: 42 U.S.C. 6905, 6912, 6925, 6927, 6974)

[44 FR 32948, June 7, 1979, as amended at 45 FR 33512, May 19, 1980; 46 FR 9460, Jan. 28, 1981; 47 FR 52309, Nov. 19, 1982; 48 FR 14293, Apr. 1, 1983]

§ 125.31 Criteria.

(a) A request for the establishment of effluent limitations under this subpart (fundamentally different factors variance) shall be approved only if:

(1) There is an applicable national limit which is applied in the permit and specifically controls the pollutant for which alternative effluent limitations or standards have been requested; and

(2) Factors relating to the discharge controlled by the permit are fundamentally different from those considered by EPA in establishing the national limits; and

(3) The request for alternative effluent limitations or standards is made in accordance with the procedural requirements of Part 124.

(b) A request for the establishment of effluent limitations less stringent than those required by national limits guidelines shall be approved only if:

(1) The alternative effluent limitation or standard requested is no less stringent than justified by the fundamental difference; and

(2) The alternative effluent limitation or standard will ensure compliance with sections 208(e) and 301(b)(1)(C) of the Act; and

(3) Compliance with the national limits (either by using the technologies upon which the national limits are based or by other control alternatives) would result in:

(i) A removal cost wholly out of proportion to the removal cost considered during development of the national limits; or

(ii) A non-water quality environmental impact (including energy requirements) fundamentally more adverse than the impact considered during development of the national limits.

(c) A request for alternative limits more stringent than required by national limits shall be approved only if:

(1) The alternative effluent limitation or standard requested is no more stringent than justified by the fundamental difference; and

(2) Compliance with the alternative effluent limitation or standard would not result in:

(i) A removal cost wholly out of proportion to the removal cost considered during development of the national limits; or

(ii) A non-water quality environmental impact (including energy requirements) fundamentally more adverse than the impact considered during development of the national limits.

(d) Factors which may be considered fundamentally different are:

(1) The nature or quality of pollutants contained in the raw waste load of the applicant's process wastewater;

[*Comment:* (1) In determining whether factors concerning the discharger are fundamentally different, EPA will consider, where relevant, the applicable development document for the national limits, associated technical and economic data collected for use in developing each respective national limit, records of legal proceedings, and written and printed documentation including records of communication, etc., relevant to the development of respective national limits which are kept on public file by EPA.

(2) Waste stream(s) associated with a discharger's process wastewater which were not considered in the development of the national limits will not ordinarily be treated as fundamentally different under paragraph (a) of this section. Instead, national limits should be applied to the other streams, and the unique stream(s) should be subject to limitations based on section 402(a)(1) of the Act. See § 125.2(c)(2).]

(2) The volume of the discharger's process wastewater and effluent discharged;

(3) Non-water quality environmental impact of control and treatment of the discharger's raw waste load;

(4) Energy requirements of the application of control and treatment technology;

(5) Age, size, land availability, and configuration as they relate to the discharger's equipment or facilities; processes employed; process changes; and engineering aspects of the application of control technology;

(6) Cost of compliance with required control technololgy.

(e) A variance request or portion of such a request under this section shall not be granted on any of the following grounds:

(1) The infeasibility of installing the required waste treatment equipment within the time the Act allows.

[*Comment:* Under this section a variance request may be approved if it is based on factors which relate to the discharger's ability ultimately to achieve national limits but not if it is based on factors which merely affect the discharger's ability to meet the statutory deadlines of sections 301 and 307 of the Act such as labor difficulties, construction schedules, or unavailability of equipment.]

(2) The assertion that the national limits cannot be achieved with the appropriate waste treatment facilities installed, if such assertion is not based on factor(s) listed in paragraph (d) of this section;

[*Comment:* Review of the Administrator's action in promulgating national limits is available only through the judicial review procedures set forth in section 509(b) of the Act.]

(3) The discharger's ability to pay for the required waste treatment; or

(4) The impact of a discharge on local receiving water quality.

(f) Nothing in this section shall be construed to impair the right of any State or locality under section 510 of the Act to impose more stringent limitations than those required by Federal law.

§ 125.32 Method of application.

(a) A written request for a variance under this subpart shall be submitted in duplicate to the Director in accordance with Part 124, Subpart F.

(b) The burden is on the person requesting the variance to explain that:

(1) Factor(s) listed in § 125.31(b) regarding the discharger's facility are fundamentally different from the factors EPA considered in establishing the national limits. The requester should refer to all relevant material and information, such as the published guideline regulations development document, all associated technical and economic data collected for use in developing each national limit, all records of legal proceedings, and all written and printed documentation including records of communication, etc., relevant to the regulations which are kept on public file by the EPA;

(2) The alternative limitations requested are justified by the fundamental difference alleged in paragraph (b)(1) of this section; and

(3) The appropriate requirements of § 125.31 have been met.

Subpart E—Criteria for Granting Economic Variances From Best Available Technology Economically Achievable Under Section 301(c) of the Act—[Reserved]

Subpart F—Criteria for Granting Water Quality Related Variances Under Section 301(g) of the Act—[Reserved]

Subpart G—Criteria for Modifying the Secondary Treatment Requirements Under Section 301(h) of the Clean Water Act

AUTHORITY: Clean Water Act, secs. 301, 304, 501, Pub. L. 92-500, 86 Stat. 816, as amended by, Pub. L. 95-217, 91 Stat. 1566, as amended by, Pub. L. 97-117, 95 Stat. 1623 (33 U.S.C. 1311, 1314, 1361)

SOURCE: 47 FR 53675, Nov. 26, 1982, unless otherwise noted.

§ 125.56 Scope and purpose.

This subpart establishes the criteria to be applied by EPA in acting on section 301(h) requests for modifications to the secondary treatment requirements. It also establishes special permit conditions which must be included in any permit incorporating a section 301(h) modification of the secondary treatment requirements. ("section 301(h) modified permit").

§ 125.57 Law governing issuance of a section 301(h) modified permit.

(a) Section 301(h) of the Clean Water Act provides that:

The Administrator, with the concurrence of the State, may issue a permit under section 402 which modifies the requirements of section (b)(1)(B) of this section with respect to the discharge of any pollutant from a publicly owned treatment works into marine waters, if the applicant demonstrates to the satisfaction of the Administrator that:

(1) There is an applicable water quality standard specific to the pollutant for which the modification is requested, which has been identified under section 304(a)(6) of this Act;

(2) Such modified requirements will not interfere with the attainment or maintenance of that water quality which assures protection of public water supplies and the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife, and allows recreational activities, in and on the water;

(3) The applicant has established a system for monitoring the impact of such discharge on a representative sample of aquatic biota, to the extent practicable;

(4) Such modified requirements will not result in any additional requirements on any other point or nonpoint source;

(5) All applicable pretreatment requirements for sources introducing waste into such treatment works will be enforced;

(6) To the extent practicable, the applicant has established a schedule of activities designed to eliminate the entrance of toxic pollutants from nonindustrial sources into such treatment works;

(7) There will be no new or substantially increased discharges from the point source of the pollutant to which the modification applies above that volume of discharge specified in the permit.

For the purposes of this subsection the phrase "the discharge of any pollutant into marine waters" refers to a discharge into deep waters of the territorial sea or the waters of the contiguous zone, or into saline estuarine waters where there is strong tidal movement and other hydrological and geological characteristics which the Administrator determines necessary to allow compliance with paragraph (2) of this subsection, and section 101(a)(2) of this Act. A municipality which applies secondary treatment shall be eligible to receive a permit pursuant to this subsection which modifies the requirements of subsection (b)(1)(B) of this section with respect to the discharge of any pollutant from any treatment works owned by such municipality into marine waters. No permit issued under this subsection shall authorize the discharge of sewage sludge into marine waters.

(b) Section 301(j)(1) of the Clean Water Act provides that:

Any application filed under this section for a modification of the provisions of:

(A) Subsection (b)(1)(B) under subsection (h) of this section shall be filed not later than the 365th day which begins after the date of enactment of the Municipal Wastewater Treatment Construction Grant Amendments of 1981;

(c) Section 22(e) of the Municipal Wastewater Treatment Construction Grant Amendments of 1981, Pub. L. 97-117, provides that:

The amendments made by this section shall take effect on the date of enactment of this Act, except that no applicant, other than the city of Avalon, California, who applies after the date of enactment of this Act for a permit pursuant to subsection (h) of section 301 of the Federal Water Pollution Control Act which modifies the requirements of subsection (b)(1)(B) of section 301 of such Act shall receive such permit during the one-year period which begins on the date of enactment of this Act.

§ 125.58 Definitions.

For the purpose of this subpart:

(a) "Administrator" means the EPA Administrator or a person designated by the EPA Administrator.

(b) "Altered discharge" means any discharge other than a current discharge or improved discharge, as defined in this regulation.

(c) "Applicant" means an applicant for a section 301(h) modified permit. Large applicants have populations contributing to their POTWs equal to or more than 50,000 people or average dry weather flows of 5.0 millions gallons per day (mgd) or more; small applicants have contributing populations of less than 50,000 people and average dry weather flows of less than 5.0 mgd. For the purposes of this definition the contributing population and flows shall be based on projections for the end of the five year permit term. Average dry weather flows shall be the average daily total discharge flows for the maximum month of the dry weather season.

(d) "Application" means a final application previously submitted in accordance with the June 15, 1979, section 301(h) regulations (44 FR 34784) or an application submitted between December 29, 1981 and December 29, 1982. It does not include a preliminary application submitted in accordance with the June 15, 1979, section 301(h) regulations.

(e) "Application questionnaire" means EPA's "Applicant Questionnaire for Modification of Secondary Treatment Requirements". Individual questionnaires for small applicants and for large applicants are published as Appendix A and Appendix B to this subpart, respectively.

(f) "Balanced, indigenous population" means an ecological community which:

(1) Exhibits characteristics similar to those of nearby, healthy communities existing under comparable but unpolluted environmental conditions; or

(2) May reasonably be expected to become re-established in the polluted water body segment from adjacent waters if sources of pollution were removed.

(g) "Current discharge" means the volume, composition, and location of an applicant's discharge as of anytime between December 27, 1977, and December 29, 1982, as designated by the applicant.

(h) "Improved discharge" means the volume, composition and location of an applicant's discharge following:

(1) Construction of planned outfall improvements, including, without limitation, outfall relocation, outfall repair, or diffuser modification; or

(2) Construction of planned treatment system improvements to treatment levels or discharge characteristics; or

(3) Implementation of a planned program to improve operation and maintenance of an existing treatment system or to eliminate or control the introduction of pollutants into the applicant's treatment works.

(i) "Industrial source" means any source of nondomestic pollutants regulated under section 307 (b) or (c) of the Clean Water Act which discharges into a POTW.

(j) "Modified discharge" means the volume, composition and location of the discharge proposed by the applicant for which a modification under section 301(h) of the Act is requested. A modified discharge may be a current discharge, improved discharge, or altered discharge.

(k) "Nonindustrial source" means any source of pollutants which is not an industrial source.

(l) "Ocean waters" means those coastal waters landward of the baseline of the territorial seas, the deep waters of the territorial seas, or the waters of the contiguous zone.

(m) "Pesticides" means demeton, guthion, malathion, mirex, methoxychlor and parathion.

(n) "Public water supplies" means water distributed from a public water system.

(o) "Public water system" means a system for the provision to the public of piped water for human consumption, if such system has at least fifteen

(15) service connections or regularly serves at least twenty-five (25) individuals. This term includes (1) any collection, treatment, storage and distribution facilities under the control of the operator of the system and used primarily in connection with the system, and (2) any collection or pretreatment storage facilities not under the control of the operator of the system which are used primarily in connection with the system.

(p) "Publicly owned treatment works" (POTW) means a treatment works, as defined in section 212(2) of the Act, which is owned by a State, municipality or intermunicipal or interstate agency.

(q) "Saline estuarine waters" means those semi-enclosed coastal waters which have a free connection to the territorial sea, undergo net seaward exchange with ocean waters, and have salinities comparable to those of the ocean. Generally, these waters are near the mouth of estuaries and have cross-sectional annual mean salinities greater than twenty-five (25) parts per thousand.

(r) "Secondary treatment" means the term as defined in 40 CFR Part 133.

(s) "Shellfish, fish and wildlife" means any biological population or community that might be adversely affected by the applicant's modified discharge.

(t) "Stressed waters" means those receiving environments in which an applicant can demonstrate to the satisfaction of the Administrator, that the absence of a balanced, indigenous population is caused solely by human perturbations other than the applicant's modified discharge.

(u) "Toxic pollutants" means those substances listed in 40 CFR 401.15.

(v) "Water quality standards" means applicable water quality standards which have been approved, left in effect, or promulgated under section 303 of the Clean Water Act.

(w) "Zone of initial dilution" (ZID) means the region of initial mixing surrounding or adjacent to the end of the outfall pipe or diffuser ports, provided that the ZID may not be larger than allowed by mixing zone restrictions in applicable water quality standards.

§ 125.59 General.

(a) *Basis for application.* An application under this subpart shall be based on a current, improved, or altered discharge into ocean waters or saline estuarine waters

(b) *Prohibitions.* No section 301(h) modified permit shall be issued:

(1) Where such issuance would not assure compliance with all applicable requirements of this subpart and Part 122;

(2) For the discharge of sewage sludge; and

(3) where such issuance would conflict with applicable provisions of State, local, or other Federal laws or Executive Orders. This includes compliance with the Coastal Zone Management Act of 1972, as amended, 16 U.S.C. 1451 *et seq.*; the Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 *et seq.*; and Title III of the Marine Protection, Research and Sanctuaries Act, as amended, 16 U.S.C. 1431 *et seq.*

(c) *Applications.* Each applicant for a modified permit under this subpart shall submit an application to EPA signed in compliance with 40 CFR 122.6(a)(3) which shall contain:

(1) A signed, completed NPDES Application Standard form A, Parts I, II, III:

(2) A completed Application Questionnaire;

(3) The following certification:

> I certify under penalty of law that I have personally examined and am familiar with the information submitted in the attached document(s) and, based on my inquiry of those individuals immediately responsible for obtaining the information, I am convinced that the information is true, accurate and correct. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

(d) *Revisions to applications.* (1) POTWs which submitted applications in accordance with the June 15, 1979, Regulations (44 FR 34784) may revise their applications one time following a tentative decision to propose changes to treatment levels and/or outfall and diffuser location and design in accordance with § 125.59(e)(2)(i); and

(2) Other applicants may revise their applications one time following a tentative decision to propose changes to treatment levels and/or outfall and diffuser location and design in accordance with § 125.59(e)(3)(i). Revisions by such applicants which propose downgrading treatment levels and/or outfall and diffuser location and design must be justified on the basis of substantial changes in circumstances beyond the applicant's control since the time of application submission.

(3) Applicants authorized or requested to submit additional information under § 125.59(f) may submit a revised application in accordance with § 125.59(e)(2)(ii) where such additional information supports changes in proposed treatment levels and/or outfall location and diffuser design. The opportunity for such revision shall be in addition to the one-time revision allowed under § 125.59(d) (1) and (2).

(4) POTWs which revise their applications must:

(i) Modify their NPDES form and Application Questionnaire as needed to assure that the information filed with their application is correct and complete;

(ii) Provide additional analysis and data as needed to demonstrate compliance with this subpart;

(iii) Obtain new State determinations under §§ 125.60(b)(2) and 125.63(b); and

(iv) Provide the certification described in paragraph (c)(3) of this section.

(e) *Deadlines and distribution*—(1) *Applications.* (i) The original and one copy of an application must be submitted to the appropriate EPA Regional Administrator no later than December 29, 1982, and one copy to the Office of Marine Discharge Evaluation, WH-546, U.S. Environmental Protection Agency, 401 M St. SW., Washington, DC, 20460.

(ii) A copy of the application must be provided to the State and interstate agency(s) authorized to provide certification/concurrence under §§ 124.53 to 124.55 on or before the date of the application is submitted to EPA.

(2) *Revisions to applications.* (i) Applicants desiring to revise their applications under § 125.59(d) (1) or (2) must:

(A) Submit to the appropriate Regional Administrator a letter of intent to revise their application and a copy to the Office of Marine Discharge Evaluation either within 45 days of the date of EPA's tentative decision on their original application, or within 45 days of promulgation of this provision if a tentative decision has already been made, whichever is later. Following receipt by EPA of a letter of intent, further EPA proceedings on the tentative decision under 40 CFR Part 124 will be stayed.

(B) Submit the revised application as described for new applications in § 125.59(e)(1) either within one year of the date of EPA's tentative decision on their original application or within one year of promulgation of this provision if a tentative decision has already been made, whichever is later.

(ii) Applicants desiring to revise their applications under § 125.59(d)(3) must submit the revised application as described for new applications in § 125.59(e)(1) of this part concurrent with submission of the additional information under § 125.59(f).

(3) State determination deadline. State determinations, as required by § 125.60(b)(2) and § 125.63(b) shall be filed by the applicant with the appropriate Regional Administrator, no later than 90 days after submission of the application or revision to EPA. Extensions to this deadline may be provided by EPA upon request. However, EPA will not begin review of the application or revision until a favorable State determination is received by EPA.

(f)(1) The Administrator may authorize or request an applicant to submit additional information by a specified date not to exceed one year from the date of authorization or request.

(2) Applicants seeking authorization to submit additional information on current/modified discharge characteristics, water quality, biological conditions or oceanographic characteristics must:

(i) Demonstrate that they made a diligent effort to provide such information with their application and were unable to do so, and

(ii) Submit a plan of study, including a schedule, for data collection and submittal of the additional information. EPA will review the plan of study and may require revisions prior to authorizing submission of the additional information.

(g) *Decisions on section 301(h) modifications.* (1) The decision to grant or deny a section 301(h) modification shall be made by the Administrator and shall be based on the applicant's demonstration that it has met all the requirements of §§ 125.59 through 125.65.

(2) No section 301(h) modified permit shall be issued until the appropriate State certification/concurrence is granted or waived pursuant to § 124.54 or if the State denies certification/concurrence pursuant to § 124.54.

(3) In the case of a modification issued to an applicant in a State administering an approved permit program under 40 CFR Part 123, the State Director may:

(i) Revoke an existing permit as of the effective date of the EPA issued section 301(h) modified permit; and

(ii) Cosign the section 301(h) modified permit, if the Director has indicated an intent to do so in the written concurrence.

(4) Any section 301(h) modified permit shall:

(i) Be issued in accordance with the procedures set forth in 40 CFR Part 124, except that, because section 301(h) permits may only be issued by EPA, the terms "Administrator or a person designated by the Administrator" shall be substituted for the term "Director" as appropriate; and

(ii) Contain all applicable terms and conditions set forth in 40 CFR Part 122 and § 125.67.

(5) Appeals of section 301(h) determinations shall be governed by the procedures in 40 CFR Part 124.

(6) At the expiration of the section 301(h) modified permit, the POTW should be prepared to support the continuation of the modification based on studies and monitoring performed during the life of the permit. Upon a demonstration meeting the statutory criteria and requirements of this subpart, the permit may be renewed under the applicable procedures of 40 CFR Part 124.

§ 125.60 Existence of and compliance with applicable water quality standards.

(a) There must exist a water quality standard or standards applicable to the pollutant(s) for which a section 301(h) modified permit is requested, including:

(1) Water quality standards for biochemical oxygen demand or dissolved oxygen;

(2) Water quality standards for suspended solids, turbidity, light transmission, light scattering or maintenance of the euphotic-zone; and

(3) Water quality standards for pH.

(b) The applicant must:

(1) Demonstrate that the modified discharge will comply with the above water quality standard(s); and

(2) Provide a determination signed by the State or interstate agency(s) authorized to provide certification under §§ 124.53 and 124.54 that the proposed modified discharge will comply with applicable provisions of State law including applicable water quality standards. This determination shall include a discussion of the basis for the conclusion reached.

§ 125.61 Attainment or maintenance of water quality which assures protection of public water supplies, the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife, and allows recreational activities.

(a) *Physical characteristics of discharge.* (1) The applicant's outfall and diffuser must be located and designed to provide adequate initial dilution, dispersion and transport of wastewater to meet all applicable water quality standards at and beyond the boundary of the zone of initial dilution:

(i) During periods of maximum stratification; and

(ii) During other periods when discharge characteristics, water quality, biological seasons, or oceanographic conditions indicate more critical situations may exist.

(2) Following initial dilution, the partially diluted wastewater and par-

ticulates must be transported and dispersed so as not to affect water use areas adversely (including recreational and fishing areas) and areas of biological sensitivity.

(b) *Impact of discharge on public water supplies.* (1) The applicant's modified discharge must allow for the attainment or maintenance of water quality which assures protection of public water supplies.

(2) The applicant's modified discharge must not:

(i) Prevent a planned or existing public water supply from being used, or from continuing to be used, as a public water supply; or

(ii) Have the effect of requiring treatment over and above that which would be necessary in the absence of such discharge in order to comply with local, and EPA drinking water standards.

(c) *Biological impact of discharge.* (1) The applicants modified discharge must allow for the attainment or maintenance of water quality which assures protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife.

(2) A balanced, indigenous population of shellfish, fish and wildlife must exist:

(i) Immediately beyond the zone of initial dilution of the applicant's modified discharge and;

(ii) In all other areas beyond the zone of initial dilution where marine life is actually or potentially affected by the applicant's modified discharge.

(3) Conditions within the zone of initial dilution must not contribute to extreme adverse biological impacts, including, but not limited to, the destruction of distinctive habitats of limited distribution, the presence of disease epicenters, or the stimulation of phytoplankton blooms which have adverse effects beyond the zone of initial dilution.

(4) In addition, for modified discharges into saline estuarine water:

(i) Benthic populations within the zone of initial dilution must not differ substantially from the balanced, indigenous populations which exist immediately beyond the boundary of the zone of initial dilution;

(ii) The discharge must not interfere with estuarine migratory pathways within the zone of initial dilution; and

(iii) The discharge must not result in the accumulation of toxic pollutants or pesticides at levels which exert adverse effects on the biota within the zone of initial dilution.

(d) *Impact of discharge on recreational activities.* (1) The applicant's modified discharge must allow for the attainment or maintenance of water quality which allows for recreational activities beyond the zone of initial dilution, including, without limitation, swimming, diving, boating, fishing, and picnicking and sports activities along shorelines and beaches.

(2) There must be no Federal, State, or local restrictions on recreational activities within the vicinity of the applicant's modified outfall unless such restrictions are routinely imposed around sewage outfalls. This exception shall not apply where the restriction would be lifted or modified, in whole or in part, if the applicant were discharging a secondary treatment effluent.

(e) Additional requirements for applications based on improved or altered discharges. An application for a section 301(h) modified permit on the basis of an improved or altered discharge must include:

(1) A demonstration that such improvements or alterations have been thoroughly planned and studied and can be completed or implemented expeditiously;

(2) Detailed analyses projecting changes in average and maximum monthly flow rates and composition of the applicant's discharge which are expected to result from proposed improvements or alterations.

(3) The assessements required by paragraphs (a) through (d) of this section based on its current discharge;

(4) A detailed analysis of how the applicant's planned improvements or alterations will comply with the requirements of paragraphs (a) through (d) of this section.

(f) *Stressed waters.* If an applicant believes that its failure to meet the requirements of paragraphs (a) through (e) of this section is attributable to conditions resulting from human perturbations other than its modified discharge (including, without limitation, other municipal or industrial discharges, nonpoint source runoff and the applicant's previous discharges), the applicant must demonstrate, to the satisfaction of the Administrator, that its modified discharge does not or will not:

(1) Contribute to, increase, or perpetuate such stressed conditions;

(2) Contribute to further degradation of the biota or water quality if the level of human perturbation from other sources increases; and

(3) Retard the recovery of the biota or water quality if the level of human perturbation from other sources decreases.

§ 125.62 Establishment of a monitoring program.

(a) *General requirements.* (1) The applicant must:

(i) Have a monitoring program designed to provide data to evaluate the impact of the modified discharge on the marine biota, demonstrate compliance with applicable water quality standards, and measure toxic substances in the discharge;

(ii) Describe the sampling techniques, schedules and locations (including appropriate control sites), analytical techniques, quality control and verification procedures to be used in the monitoring program;

(iii) Demonstrate that it has the resources necessary to implement the program upon issuance of the modified permit and to carry it out for the life of the modified permit; and

(iv) Determine the frequency and extent of the monitoring program taking into consideration the applicant's rate of discharge, quantities of toxic pollutants discharged, and potentially significant impacts on receiving water quality, marine biota, and designated water uses.

(2) The Administrator may require revision of the proposed monitoring program before issuing a modified permit and during the term of any modified permit.

(b) *Biological monitoring program.* The biological monitoring program for both small and large applicants shall provide data adequate to evaluate the impact of the modified discharge on the marine biota.

(1) Biological monitoring shall include to the extent practicable:

(i) Periodic surveys of the biological communities and populations which are most likely affected by the discharge to enable comparisons with baseline conditions described in the application and verified by sampling at the control stations/reference sites during the periodic surveys;

(ii) Periodic determinations of the accumulation of toxic pollutants and pesticides in organisms and examination of adverse effects, such as disease, growth abnormalities, physiological stress or death;

(iii) Sampling of sediments in areas of solids deposition in the vicinity of the ZID, in other areas of expected impact, and at appropriate reference sites to support the water quality and biological surveys and to measure the accumulation of toxic pollutants and pesticides; and

(iv) Where the discharge would affect commercial or recreational fisheries, periodic assessments of the conditions and productivity of fisheries.

(2) Small applicants are not subject to the requirements of paragraphs (b)(1) (ii) through (iv) of this section if they discharge at depths greater than 10 meters and can demonstrate through a suspended solids deposition analysis that there will be negligible seabed accumulation in the vicinity of the modified discharge.

(3) For applicants seeking a section 301(h) modified permit based on:

(i) A current discharge, biological monitoring shall be designed to demonstrate ongoing compliance with the requirements of § 125.61(c);

(ii) An improved discharge or altered discharge other than outfall relocation, biological monitoring shall provide baseline data on the current impact of the discharge and data which demonstrate, upon completion of improvements or alterations, that the requirements of § 125.61(c) are met; or

(iii) An improved or altered discharge involving outfall relocation, the biological monitoring shall:

(A) Include the current discharge site until such discharge ceases; and

(B) Provide baseline data at the relocation site to demonstrate the impact of the discharge and to provide the basis for demonstrating that requirements of § 125.61(c) will be met.

(c) *Water quality monitoring program.* The water quality monitoring program shall to the extent practicable:

(1) Provide adequate data for evaluating compliance with applicable water quality standards;

(2) Measure the presence of toxic pollutants which have been identified or reasonably may be expected to be present in the discharge.

(d) *Effluent monitoring program.* In addition to the requirements of 40 CFR Part 122, to the extent practicable, monitoring of the POTW effluent shall provide quantitative and qualitative data which measure toxic substances and pesticides in the effluent and the effectiveness of the toxics control program.

§ 125.63 Effect of discharge on other point and nonpoint sources.

(a) No modified discharge may result in any additional pollution control requirements on any other point or nonpoint source.

(b) The applicant shall obtain a determination from the State or interstate agency(s) having authority to establish wasteload allocations indicating whether the applicant's discharge will result in an additional treatment, pollution control, or other requirement on any other point or nonpoint sources. The State determination shall include a discussion of the basis for its conclusion.

§ 125.64 Toxics control program.

(a) *Chemical analysis.* (1) The applicant shall submit at the time of application a chemical analysis of its current discharge for all toxic pollutants and pesticides as defined in § 125.58 (u) and (m). The analysis shall be performed on two 24 hour composite samples (one dry weather and one wet weather). Applicants may supplement or substitute chemical analyses if composition of the supplemental or substitute samples typifies that which occurs during dry and wet weather conditions.

(2) Unless required by the State, this requirement shall not apply to any small section 301(h) applicant which certifies that there are no known or suspected sources of toxic pollutants or pesticides and documents the certification with an industrial user survey as described by 40 CFR 403.8(f)(2).

(b) *Identification of sources.* The applicant shall submit at the time of application an analysis of the known or suspected sources of toxic pollutants or pesticides identified in § 125.64(a). The applicant shall to the extent practicable categorize the sources according to industrial and nonindustrial types.

(c) *Industrial pretreatment requirements.* (1) An applicant which has known or suspected industrial sources of toxic pollutants shall have an approved pretreatment program, or shall develop an approved pretreatment program by July 1, 1983, or the date established in their NPDES permit, whichever is earlier. *See,* 40 CFR Part 403.

(2) This requirement shall not apply to any applicant which has no known or suspected industrial sources of toxic pollutants or pesticides and so certifies to the Administrator.

(3) The pretreatment program or proposed compliance schedule submitted by the applicant under this section shall be subject to revision as required by the Administrator prior to issuing any section 301(h) modified permit and during the term of any such permit.

(4) Implementation of all existing pretreatment requirements and authorities must be maintained through the period of development of any additional pretreatment requirements that may be necessary to comply with the requirements of this subpart.

(d) *Nonindustrial source control program.* (1) The applicant shall submit a proposed public education program designed to minimize the entrance of nonindustrial toxic pollutants and pesticides into its POTW(s) which shall be implemented no later than 18 months after issuance of a 301(h) modified permit.

(2) The applicant shall also develop and implement additional nonindustrial source control programs on the

earliest possible schedule. This requirement shall not apply to a small applicant which certifies that there are no known or suspected water quality, sediment accumulation, or biological problems related to toxic pollutants or pesticides in its discharge.

(3) The applicant's nonindustrial source control programs under paragraph (d)(2) of this section shall include the following schedules which are to be implemented no later than 18 months after issuance of a 301(h) modified permits:

(i) A schedule of activities for identifying nonindustrial sources of toxic pollutants and pesticides; and

(ii) A schedule for the development and implementation of control programs, to the extent practicable, for nonindustrial sources of toxic pollutants and pesticides.

(4) Each proposed nonindustrial source control program and/or schedule submitted by the applicant under this section shall be subject to revision as determined by the Administrator prior to issuing any section 301(h) modified permit and during the term of any such permit.

Editorial Note: Industrial use survey portion of paragraph (a)(2) of § 125.64, published at 47 FR 53675, Nov. 26, 1982, contains information collection requirements which will not be effective until OMB approval has been obtained.

§ 125.65 Increase in effluent volume or amount of pollutants discharged.

(a) No modified discharge may result in any new or substantially increased discharges of the pollutant to which the modification applies above the discharge specified in the section 301(h) modified permit.

(b) Where pollutant discharges are attributable in part to combined sewer overflows, the applicant shall minimize existing overflows and prevent increases in the amount of pollutants discharged;

(c) The applicant shall provide projections of effluent volume and mass loadings for any pollutants to which the modification applies in 5 year increments for the design life of its facility.

§ 125.66 [Reserved]

§ 125.67 Special conditions for section 301(h) modified permits.

Each section 301(h) modified permit issued shall contain, in addition to all applicable terms and conditions required by 40 CFR Part 122, the following:

(a) Effluent limitations and mass loadings which will assure compliance with the requirements of this subpart;

(b) A schedule or schedules of compliance for:

(1) Pretreatment program development required by § 125.64(c);

(2) Nonindustrial toxics control program required by § 125.64(d); and

(3) Control of combined sewer overflows required by § 125.65.

(c) Monitoring program requirements that include:

(1) Biomonitoring requirements of § 125.62(b);

(2) Water quality requirements of § 125.62(c);

(3) Effluent monitoring requirements of § 125.62(d).

(d) Reporting requirements that include the results of the monitoring programs required by paragraph (c) of this section at such frequency as prescribed in the approved monitoring program.

APPENDIX A—SMALL APPLICANT QUESTIONNAIRE FOR MODIFICATION OF SECONDARY TREATMENT REQUIREMENTS

I. Introduction

This questionnaire is to be used by small applicants for modification of secondary treatment requirements under section 301(h) of the Clean Water Act (CWA). A small applicant has a contributing population to its wastewater treatment facility of less than 50,000 and a projected average dry weather flow of less than 5.0 million gallons per day (mgd, 0.22m^3/sec) [40 CFR 125.58(c)].

The questionnaire is in two sections, a general information and basic requirements section and a technical evaluation section. Satisfactory completion of this questionnaire is necessary to enable EPA to determine whether the applicant's modified discharge meets the criteria of section 301(h) and EPA regulations (40 CFR Part 125, Subpart G).

Where applicants diligently try but are unable to collect and submit all the information at the time of application, EPA requires that a plan of study for gathering and submitting the data be provided with the application. 40 CFR 125.59(f) states the procedures governing such post-application data collection activities.

Most small applicants should be able to complete the questionnaire using available information. However, small POTWs with low initial dilution discharging into shallow waters or waters with poor dispersion and transport characteristics, discharging near distinctive and susceptible biological habitats, or discharging substantial quantities of toxics should anticipate the need to collect additional information and/or conduct additional analyses to demonstrate compliance with section 301(h) criteria. Such small applicants are directed to the related sections in Parts II and III of the large applicant questionnaire and must answer the relevant questions of these sections. If there are questions in this regard, applicants should contact the appropriate EPA Regional Office for guidance.

Guidance for responding to this questionnaire is provided by the revised section 301(h) Technical Support Document. Where available information is incomplete and the applicant needs to collect additional data during the period it is preparing the application, EPA encourages the applicant to consult with EPA prior to data collection and submission of its application. Such consultation, particularly if the applicant provides a plan of study, will help assure that the proper data are gathered in the most efficient manner.

II. General Information and Basic Data Requirements

Applicants should answer all questions; where your response to a question is "yes", "no", or "not applicable" explain the basis for your response. Where your answer indicates that you cannot meet a regulatory or statutory criterion, discuss why you believe you qualify for a section 301(h) variance.

A. *Treatment System Description:*

1. Are you applying for a modification based on a current discharge, improved discharge, or altered discharge as defined in 40 CFR 125.58? [40 CFR 125.59(a)]

2. Description of the Treatment/Outfall System [40 CFR 125.61(a) and 125.61(e)]

a. Provide detailed descriptions and diagrams of the treatment system and outfall configuration which you propose to satisfy the requirements of section 301(h) and 40 CFR Part 125, Subpart G. What is the total discharge design flow upon which this application is based?

b. Provide a map showing the geographic location of the proposed outfall(s) (i.e., discharge). What is the latitude and longitude of the proposed outfall(s)?

c. For a modification based on an improved or altered discharge, provide a description and diagram of your current treatment system and outfall configuration. Include the current outfall's latitude and longitude if different from the proposed outfall.

3. Effluent Limitations and Characteristics [40 CFR 125.60(b) and 125.61(e)(2)]

a. Identify the final effluent limitations for five-day biochemical oxygen demand (BOD5), suspended solids, and pH upon which your application for a modification is based:

BOD5 —— mg/l
Suspended solids —— mg/l
pH —— (range)

b. Provide available data on the following effluent characteristics for your current discharge as well as for the modified discharge if different from the current discharge:

- Flow (m^3/sec): minimum; average dry weather; average wet weather; maximum; annual average.
- BOD5 (mg/l) for the following plant flows: minimum; average dry weather; average wet weather; maximum; annual average.
- Suspended solids (mg/l) for the following plant flows: minimum; average dry weather; average wet weather; maximum; annual average.
- Toxic pollutants and pesticides (μg/l): list each identified toxic pollutant and pesticide.
- pH: minimum and maximum.
- Dissolved oxygen (mg/l, prior to chlorination) for the following plant flows: minimum; average dry weather; average wet weather; maximum; annual average.
- Immediate dissolved oxygen demand (mg/l).

4. Effluent Volume and Mass Emissions [40 CFR 125.61(e)(2) and 125.65]

a. Provide analyses showing projections of effluent volume (annual average, m^3/sec) and mass loadings (mt/year) of BOD5 and suspended solids for the design life of your treatment facility in five-year increments. If the application is based upon an improved or altered discharge, the projections must be provided with and without the proposed improvements or alterations.

b. Provide projections for the end of your five year permit term for (1) the treatment facility contributing population and (2) the average daily total discharge flow for the maximum month of the dry weather season.

5. Average Daily Industrial Flow (m^3/sec) [40 CFR 125.64] Provide or estimate the average daily industrial inflow to your treatment facility for the same time increments as in question II. A. 4. a. of this appendix.

6. Combined Sewer Overflows [40 CFR 125.65(b)]

a. Does (will) your collection and treatment system include combined sewer overflows?

b. If yes, provide a description of your plan for minimizing combined sewer overflows to the receiving water.

7. Outfall/Diffuser Design. Provide available data on the following for your current discharge as well as for the modified discharge, if different from the current discharge: [40 CFR 125.61(a)(1)]

—Diameter and length of the outfall(s) (meters)
—Diameter and length of the diffuser(s) (meters)
—Angle(s) of port orientations from horizontal (degrees)
—Port diameter(s) in meters and the orifice contraction coefficient(s), if known
—Vertical distance in meters from mean lower low water (or mean low water) surface and outfall port(s) centerline (meters)
—Number of ports
—Port spacing (meters)
—Design flow rate for each port, if multiple ports are used (m³/sec)

B. *Receiving Water Description:*

1. Are you applying for a modification based on a discharge to the ocean or to a saline estuary (40 CFR 125.58(q))? [40 CFR 125.59(a)]

2. Is your current discharge or modified discharge to stressed waters? If yes, what are the pollution sources contributing to the stress? [40 CFR 125.61(f)]

3. Provide a description and available data on the seasonal circulation patterns in the vicinity of your current and modified discharge(s). [40 CFR 125.61(a)]

4. Ambient Water Quality Conditions During the Period(s) of Maximum Stratification.

a. Provide available data on the following in the vicinity of the current discharge location and for the modified discharge location if different from the current discharge: [40 CFR 125.60(b)(1)]

—Dissolved oxygen (mg/l)
—Suspended solids (mg/l)
—pH
—Temperature (°C)
—Salinity (ppt)
—Transparency (turbidity, percent light transmittance)
—Other significant parameters (eg, nutrients, toxic pollutants and pesticides, fecal coliforms)

b. Are there other periods when receiving water quality conditions may be more critical than the period(s) of maximum stratification? If so, describe these other critical periods and provide the data requested in 4.a. for the other critical periods. [40 CFR 125.61(a)(1)]

C. *Biological Conditions:*

1. a. Are distinctive habitats of limited distribution (such as kelp beds or coral reefs) located in areas potentially affected by the modified discharge? [40 CFR 125.61(c)]

b. If yes, provide available information on types, extent, and location of habitats.

2. a. Are commercial or recreational fisheries located in areas potentially affected by the modified discharge? [40 CFR 125.61(c)]

b. If yes, provide available information on types, location, and value of fisheries.

D. *State and Federal Laws* [40 CFR 125.60]:

1. Are there water quality standards applicable to the following pollutants for which a modification is requested:

—Biochemical oxygen demand or dissolved oxygen?
—Suspended solids, turbidity, light transmission, light scattering, or maintenance of the euphotic zone?
—pH of the receiving water?

2. If yes, what is the water use classification for your discharge area? What are the applicable standards for your discharge area for each of the parameters for which a modification is requested? Provide a copy of all applicable water quality standards or a citation to where they can be found.

3. Will the modified discharge [40 CFR 125.59(b)(3)]:

—Be consistent with applicable State coastal zone management program(s) approved under the Coastal Zone Management Act as amended, 16 U.S.C. 1451 *et seq.*? (*See*, 16 U.S.C. 1456(c)(3)(A)).
—Be located in a Marine sanctuary designated under Title III of the marine Protection, Research and Sanctuaries Act (MPRSA) as amended, 16 U.S.C. 1431 *et seq.* or in an estuarine sanctuary designated under the Coastal Zone Management Act as amended, 16 U.S.C. 1461? If located in a marine sanctuary designated under Title III of the MPRSA, attach a copy of any certification or permit required under regulations governing such marine sanctuary (*See*, U.S.C. 1432(f)(2)).
—Be consistent with the Endangered Species Act as amended, 16 U.S.C. 1531 *et seq*? Provide the names of any threatened or endangered species that inhabit or obtain nutrients from waters that may be affected by the modified discharge. Identify any critical habitat that may be affected by the modified discharge and evaluate whether the modified discharge will affect threatened or endangered species or modify a critical habitat (*See*, 16 U.S.C. 1536(a)(2)).

4. Are you aware of any State or Federal Laws or regulations (other than the Clean

Water Act or the three statutes identified in item 3 above) or an Executive Order which is applicable to your discharge? If yes, provide sufficient information to demonstrate that your modified discharge will comply with such law(s), regulation(s), or order(s). [40 CFR 125.59(b)(3)]

III. Technical Evaluation

Answers to the following questions will be used to assess the effects of the modified discharge. The responses will be used by the State agency(s) in their determination (as required by 40 CFR 125.60(b)(2) and 125.63(b)) and by EPA in preparing its decision on the applicant's request for a section 301(h) variance.

Your answers to the following questions must be supported by data and responses from Section II of this questionnaire. The analyses and calculations required below must show the input data for all calculations. Applicants should answer all questions; where your answer to a question is "yes", "no" or "not applicable" explain the basis for your response. Where your answer indicates that you cannot meet a regulatory or statutory criterion, discuss why you believe you qualify for a variance.

If EPA decides to check calculations in an application, the formulas and methods provided in the revised section 301(h) Technical Support Document may be used for that purpose. If applicants use methods other than those provided in the Technical Support Document, such methods must be described by the applicant.

A. *Physical Characteristics of Discharge* (40 CFR 125.61(a)).

1. What is the lowest initial dilution for your current and modified discharge(s) during (1) the period(s) of maximum stratification? and (2) any other critical period(s) of discharge volume/composition, water quality, biological seasons, or oceanographic conditions?

2. What are the dimensions of the zone of initial dilution for your modified discharge(s)?

3. Will there be significant sedimentation of suspended solids in the vicinity of the modified discharge?

B. *Compliance with Applicable Water Quality Standards*: [40 CFR 125.60(b) and 125.61(a)]

1. What is the concentration of dissolved oxygen immediately following initial dilution for the period(s) of maximum stratification and any other critical period(s) of discharge volume/composition, water quality, biological seasons, or oceanographic conditions?

2. What is the farfield dissolved oxygen depression and resulting concentration due to BOD exertion of the wastefield during the period(s) of maximum stratification and any other critical period(s)?

3. What is the increase in receiving water suspended solids concentration immediately following initial dilution of the modified discharge(s)?

4. Does (will) the modified discharge comply with applicable water quality standards for:

—Dissolved oxygen?

—Suspended solids or surrogate standards?

—pH?

5. Provide the determination required by 40 CFR 125.60(b)(2) or, if the determination has not yet been received, a copy of a letter to the appropriate agency(s) requesting the required determination.

C. *Impact on Public Water Supplies* [40 CFR 125.61(b)]:

1. Is there a planned or existing public water supply (desalinization facility) intake in the vicinity of the current or modified discharge?

2. If yes,

(a) What is the location of the intake(s) (latitude and longitude)?

(b) Will the modified discharge(s) prevent use of the intake(s) for public water supply?

(c) Will the modified discharge(s) cause increased treatment requirements for the public water supply(s) to meet local, State, and EPA drinking water standards?

D. *Biological Impact of Discharge* [40 CFR 125.61(c)]:

1. Does (will) a balanced indigenous population of shellfish, fish, and wildlife exist:

(a) Immediately beyond the ZID of the current and modified discharge(s)?

(b) In all other areas beyond the ZID where marine life is actually or potentially affected by the current and modified discharge(s)?

2. Have distinctive habitats of limited distribution been impacted adversely by the current discharge and will such habitats be impacted adversely by the modified discharge?

3. Have commercial or recreational fisheries been impacted adversely (e.g., warnings, restrictions, closures, or mass mortalities) by the current discharge and will they be impacted adversely by the modified discharge?

4. For discharges into saline estuarine waters: [40 CFR 125.61(c)(4)]

(a) Does or will the current or modified discharge cause substantial differences in the benthic population with the ZID and beyond the ZID?

(b) Does or will the current or modified discharge interfere with migratory pathways within the ZID?

(c) Does or will the current or modified discharge result in bioaccumulation of toxic pollutants or pesticides at levels which exert adverse effects on the biota within the ZID?

5. For improved discharges, will the proposed improved discharge(s) comply with

the requirements of 40 CFR 125.61(a) through 125.61(d)? [40 CFR 125.61(e)].

6. For altered discharge(s), will the altered discharge(s) comply with the requirements of 40 CFR 125.61(a) through 125.61(d)? [40 CFR 125.61(e)]

7. If your current discharge is to stressed waters, does or will your current or modified discharge: [40 CFR 125.61(f)]

(a) Contribute to, increase, or perpetuate such stressed condition?

(b) Contribute to further degradation of the biota or water qualtiy if the level of human perturbation from other sources increases?

(c) Retard the recovery of the biota or water quality if human perturbation from other sources decreases?

E. *Impacts of Discharge on Recreational Activities:* [40 CFR 125.61(d)]

1. Describe the existing or potential recreational activities likely to be affected by the modified discharge(s) beyond the zone of initial dilution.

2. What are the existing and potential impacts of the modified discharge(s) on recreational activities? Your answer should include, but not be limited to, a discussion of fecal coliforms.

3. Are there any Federal, State or local restrictions on recreational activities in the vicinity of the modified discharge(s)? If yes, describe the restrictions and provide citations to available references.

4. If recreational restrictions exist, would such restrictions be lifted or modified if you were discharging a secondary treatment effluent?

F. *Establishment of a Monitoring Program* (40 CFR 125.62):

(1) Describe the biological, water quality, and effluent monitoring programs which you propose to meet the criteria of 40 CFR 125.62.

(2) Describe the sampling techniques, schedules, and locations, analytical techniques, quality control and verification procedures to be used.

(3) Describe the personnel and financial resources available to implement the monitoring programs upon issuance of a modified permit and to carry it out for the life of the modified permit.

G. *Effect of Discharge on Other Point and Nonpoint Sources:* (40 CFR 125.63).

1. Does (will) your modified discharge(s) cause additional treatment or control requirements for any other point or nonpoint pollution source(s)?

2. Provide the determination required by 40 CFR 125.63(b) or, if the determination has not yet been received, a copy of a letter to the appropriate agency(s) requesting the required determination.

H. *Toxics Control Program* [40 CFR 125.64]

1. a. Do you have any known or suspected industrial sources of toxic pollutants and pesticides?

b. If no, provide the certification required by 40 CFR 125.64(a)(2).

c. If yes, provide the results of wet and dry weather effluent analyses for toxic pollutants and pesticides.

d. Provide an analysis of known or suspected industrial sources of toxic pollutants and pesticides identified in (1)(c) above.

2. Do you have an approved industrial pretreatment program?

a. If yes, provide the date of EPA approval.

b. If no, and if required by 40 CFR Part 403 to have an industrial pretreatment program, provide a proposed schedule for development and implementation of your industrial pretreatment program to meet the requirements of 40 CFR Part 403.

3. Describe the public education program you propose to minimize the entrance of nonindustrial toxic pollutants and pesticides into your treatment system.

4. a. Are there any known or suspected water quality, sediment accumulation, or biological problems related to toxic pollutants or pesticides from your modified discharge(s)?

b. If no, provide the certification required by 40 CFR 125.64(d)(2) together with available supporting data.

c. If yes, provide a schedule for development and implementation of nonindustrial toxics control programs to meet the requirements of 40 CFR 125.64(d)(3).

(Approved by the Office of Management and Budget under control number 2000-0427)

[47 FR 53675, Nov. 26, 1982, as amended at 48 FR 31404, July 8, 1983]

APPENDIX B—LARGE APPLICANT QUESTIONNAIRE FOR MODIFICATION OF SECONDARY TREATMENT REQUIREMENTS

I. Introduction

This questionnaire is to be used by large applicants for modification of secondary treatment requirements under section 301(h) of the Clean Water Act (CWA). A large applicant has a population contributing to its wastewater treatment facility of at least 50,000 or a projected average dry weather flow of its discharge of at least 5.0 million gallons per day (mgd, 0.22 m^3/sec) [40 CFR 125.58(c)].

The questionnaire is in two sections, a general information and basic requirements section and a technical evaluation section. Satisfactory completion of this questionnaire is necessary to enable EPA to determine whether the applicant's modified discharge meets the criteria of section 301(h) and EPA regulations (40 CFR Part 125, Subpart G).

Where applicants diligently try but are unable to collect and submit all the information at the time of application, EPA requires that a plan of study for gathering and submitting the data be provided with the application. 40 CFR 125.59(f) states the procedures governing such post-application data collection activities.

Guidance for responding to the questions is provided by the revised section 301(h) Technical Support Document. Where available information is incomplete and the applicant needs to collect additional data during the period it is preparing the application, EPA encourages the applicant to consult with EPA prior to data collection and submission of its application. Such consultation, particularly if the applicant provides a plan of study, will help assure that the proper data are gathered in the most efficient manner.

II. General Information and Basic Data Requirements

Applicants should answer all questions; where your response to a question is "yes", "no", or "not applicable" explain the basis for your response. Where your answer indicates that you cannot meet a regulatory or statutory criterion, discuss why you believe you qualify for a section 301(h) variance.

A. *Treatment System Description:*

1. Are you applying for a modification based on a current discharge, improved discharge, or altered discharge as defined in 40 CFR 125.58? [40 CFR 125.59(a)]

2. Description of the Treatment/Outfall System [40 CFR 125.61(a) and 125.61(e)]

a. Provide detailed descriptions and diagrams of the treatment system and outfall configuration which you propose to satisfy the requirements of section 301(h) and 40 CFR Part 125, Subpart G. What is the total discharge design flow upon which this application is based?

b. Provide a map showing the geographic location of the proposed outfall(s) (i.e., discharge). What is the latitude and longitude of the proposed outfall(s)?

c. For a modification based on an improved or altered discharge, provide a description and diagram of your current treatment system and outfall configuration. Include the current outfall's latitude and longitude, if different from the proposed outfall.

3. Effluent Limitations and Characteristics [40 CFR 125.60(b) and 125.61(e)(2)]

a. Identify the final effluent limitations for five-day biochemical oxygen demand (BOD5), suspended solids, and pH upon which your application for a modification is based:

BOD5 —— mg/l
Suspended solids —— mg/l
pH —— (range)

b. Provide data on the following effluent characteristics for your current discharge as well as for the modified discharge if different from the current discharge:

Flow (m^3/sec): minimum; average dry weather; average wet weather; annual average; maximum.

BOD5 (mg/l) for the following plant flows: minimum; average dry weather; average wet weather; maximum; annual average.

Suspended solids (mg/l) for the following plant flows: minimum; average dry weather; average wet weather; maximum; annual average.

Toxic pollutants and pesticides (ug/l): list each identified toxic pollutant and pesticide.

pH: minimum and maximum.

Dissolved oxygen (mg/l, prior to chlorination) for the following plant flows: minimum; average dry weather; average wet weather; maximum; annual average.

Immediate dissolved oxygen demand (mg/l)

4. Effluent Volume and Mass Emissions [40 CFR 125.61(e)(2) and 125.65]

a. Provide detailed analyses showing projections of effluent volume (annual average, m^3/sec) and mass loadings (mt/year) of BOD5 amd suspended solids for the design life of your treatment facility in five-year increments. If the application is based upon an improved or altered discharge, the projections must be provided with and without the proposed improvements or alterations.

b. Provide projections for the end of your five year permit term for (1) the treatment facility contributing population and (2) the average daily total discharge flow for the maximum month of the dry weather season.

5. Average Daily Industrial Flow (m^3/sec) [40 CFR 125.64] Provide or estimate the average daily industrial inflow to your treatment facility for the same time increments as in question II. A. 4. a. of this Appendix B.

6. Combined Sewer Overflows [40 CFR 125.65(b)]

a. Does (will) your collection and treatment system include combined sewer overflows?

b. If yes, provide a description of your plan for minimizing combined sewer overflows to the receiving water.

7. Outfall/Diffuser Design. Provide the following data for your current discharge as well as for the modified discharge, if different from the current discharge: [40 CFR 125.61(a)(1)]

Diameter and length of the outfall(s) (meters)

Diameter and length of the diffuser(s) (meters)

Angle(s) of port orientations from horizontal (degrees)

Port diameter(s) in meters and the orifice contraction coefficient(s), if known.

Vertical distance in meters from mean lower low water (or mean low water) surface and outfall port(s) centerline (meters)

Number of ports

Port spacing (meters)

Design flow rate for each port, if multiple ports are used (m^3/sec)

B. *Receiving Water Description*:

1. Are you applying for a modification based on a discharge to the ocean or to a saline estuary (40 CFR 125.58(q))? [40 CFR 125.59(a)]

2. Is your current discharge or modified discharge to stressed waters? If yes, what are the pollution sources contributing to the stress? [40 CFR 125.61(f)]

3. Provide a description and data on the seasonal circulation patterns in the vicinity of your current and modified discharge(s). [40 CFR 125.61(a)]

4. Oceanographic Conditions in the Vicinity of the Current and Proposed Modified Discharge(s).

Provide data on the following: [40 CFR 125.61(a)]

Lowest ten percentile current speed (m/sec)

Predominant current speed (m/sec) and direction (true) during the four seasons

Period(s) of maximum stratification (months)

Period(s) of natural upwelling events (duration and frequency, months)

Density profiles during period(s) of maximum stratification

5. Ambient Water Quality Conditions During the Period(s) of Maximum Stratification: at the zone of initial dilution (ZID) boundary, at other areas of potential impact, and at control stations: [40 CFR 125.61(a)(2)]

a. Provide profiles (with depth) on the following for the current discharge location and for the modified discharge location, if different from the current discharge:

BOD5 (mg/l)

Dissolved oxygen (mg/l)

Suspended solids (mg/l)

pH

Temperature (°C)

Salinity (ppt)

Transparency (turbidity, percent light transmittance)

Other significant parameters (e.g., nutrients, toxic pollutants and pesticides, fecal coliforms)

b. Are there other periods when receiving water quality conditions may be more critical than the period(s) of maximum stratification? If so, describe these other critical periods and provide the data requested in 5.a. for the other critical period(s). [40 CFR 125.61(a)(1)]

6. Provide data on steady state sediment dissolved oxygen demand and dissolved oxygen demand due to resuspension of sediments in the vicinity of your current and modified discharge(s) (mg/l/day).

C. *Biological Conditions:*

1. Provide a detailed description of representative biological community (eg, plankton, macrobenthos, demersal fish, etc.) in the vicinity of your current and modified discharge(s): Within the ZID, at the ZID boundary, at other areas of potential, discharge-related impact, and at reference (control) sites. Community characteristics to be described shall include (but not be limited to) species composition; abundance; dominance and diversity; spatial/temporal distribution; growth and reproduction; disease frequency; trophic structure and productivity patterns; presence of opportunistic species; bioaccumulation of toxic materials; and the occurrence of mass mortalities.

2. a. Are distinctive habitats of limited distribution (such as kelp beds or coral reefs) located in areas potentially affected by the modified discharge? [40 CFR 125.61(c)]

b. If yes, provide information on type, extent, and location of habitats.

3. a. Are commercial or recreational fisheries located in areas potentially affected by the discharge? [40 CFR 125.61(c)]

b. If yes, provide information on types, location, and value of fisheries.

D. *State and Federal Laws* [40 CFR 125.60]:

1. Are there water quality standards applicable to the following pollutants for which a modification is requested:

Biochemical oxygen demand or dissolved oxygen?

Suspended solids, turbidity, light transmission, light scattering, or maintenance of the euphotic zone?

pH of the receiving water?

2. If yes, what is the water use classification for your discharge area? What are the applicable standards for your discharge area for each of the parameters for which a modification is requested? Provide a copy of all applicable water quality standards or a citation to where they can be found.

3. Will the modified discharge: [40 CFR 125.59(b)(3)]

Be consistent with applicable State coastal zone management program(s) approved under the Coastal Zone Management Act as amended, 16 U.S.C. 1451 *et seq.?* (*Sec*, 16 U.S.C. 1456(c)(3)(A))

Be located in a marine sanctuary designated under Title III of the Marine Protection, Research and Sanctuaries Act (MPRSA) as amended, 16 U.S.C. 1431 *et seq.* or in an estuarine sanctuary designated under the Coastal Zone Management Act as amended, 16 U.S.C. 1461? If located in a marine sanctuary designated under Title III of the

MPRSA, attach a copy of any certification or permit required under regulations governing such marine sanctuary (*See*, 16 U.S.C. 1432(f)(2)).

Be consistent with the Endangered Species Act as amended, 16 U.S.C. 1531 *et seq.?* Provide the names of any threatened or endangered species that inhabit or obtain nutrients from waters that may be affected by the modified discharge. Identify any critical habitat that may be affected by the modified discharge and evaluate whether the modified discharge will affect threatened or endangered species or modify a critical habitat (*See*, 16 U.S.C. 1536(a)(2)).

4. Are you aware of any State or Federal Laws or regulations (other than the Clean Water Act or the three statutes identified in item 3 above) or an Executive Order which is applicable to your discharge? If yes, provide sufficient information to demonstrate that your modified discharge will comply with such law(s), regulations, or order(s). [40 CFR 125.59(b)(3)]

III. Technical Evaluation

Answers to the following questions will be used to assess the effects of the modified discharge. The responses will be used by the State agency(s) in their determination (as required by 40 CFR 125.60(b)(2) and 125.63(b)), and by EPA in preparing its decision on the applicant's request for a section 301(h) variance.

Your answers to the following questions must be supported by data and responses from Section II of this questionnaire. The analyses and calculations required below must show the input data for all calculations. Applicants should answer all questions; where your answer to a question is "yes", "no", or "not applicable", explain the basis for your response. Where your answer indicates that you cannot meet a regulatory or statutory criterion, discuss why you believe you qualify for a variance.

If EPA decides to check calculations in an application, the formulas and methods provided in the revised section 301(h) Technical Support Document may be used for that purpose. If applicants use methods other than those provided in the Technical Support Document, such methods must be described by the applicant.

A. *Physical Characteristics of Discharge* [40 CFR 125.61(a)]: 1. What is the critical initial dilution for your current and modified discharge(s) during (1) the period(s) of maximum stratification? and (2) any other critical period(s) of discharge volume/composition, water quality, biological seasons, or oceanographic conditions?

2. What are the dimensions of the zone of initial dilution for your modified discharge(s)?

3. What are the effects of ambient currents and stratification on dispersion and transport of the discharge plume/wastefield?

4. Sedimentation of suspended solids.

a. What fraction of the modified discharge's suspended solids will accumulate within the vicinity of the modified discharge?

b. What are the calculated area(s) and rate(s) of sediment accumulation within the vicinity of the modified discharge(s) (g/m^2/yr)?

c. What is the fate of settleable solids transported beyond the calculated sediment accumulation area?

B. *Compliance with Applicable Water Quality Standards* [40 CFR 125.60(b) and 125.61(a)]:

1. What is the concentration of dissolved oxygen immediately following initial dilution for the period(s) of maximum stratification and any other critical period(s) of discharge volume/composition, water quality, biological seasons, or oceanographic conditions?

2. What is the farfield dissolved oxygen depression and resulting concentration due to BOD exertion of the wastefield during the period(s) of maximum stratification and any other critical period(s)?

3. What are the dissolved oxygen depressions and concentrations due to steady sediment demand and resuspension of sediments?

4. What is the increase in receiving water suspended solids concentration immediately following initial dilution of the modified discharge(s)?

5. What is the change in receiving water pH immediately following initial dilution of the modified discharge(s)?

6. Does (will) the modified discharge comply with applicable water quality standards for:

Dissolved oxygen?

Suspended solids or surrogate standards?

pH?

7. Provide the determination required by 40 CFR 125.60(b)(2) or, if the determination has not yet been received, a copy of a letter to the appropriate agency(s) requesting the required determination.

C. *Impact on Public Water Supplies* [40 CFR 125.61(b)].

1. Is there a planned or existing public water supply (desalinization facility) intake in the vicinity of the current or modified discharge?

2. If yes,

a. What is the location of the intake(s) (latitude and longitude)?

b. Will the modified discharge(s) prevent use of the intake(s) for public water supply?

c. Will the modified discharge(s) cause increased treatment requirements for the public water supply(s) to meet local, State, and EPA drinking water standards?

D. *Biological Impact of Discharge* [40 CFR 125.61(c)]:

1. Does (will) a balanced indigenous population of shellfish, fish, and wildlife exist:

a. Immediately beyond the ZID of the current and modified discharge(s)?

b. In all other areas beyond the ZID where marine life is actually or potentially affected by the current and modified discharge(s)?

2. Have distinctive habitats of limited distribution been impacted adversely by the current discharge and will such habitats be impacted adversely by the modified discharge?

3. Have commercial or recreational fisheries been impacted adversely by the current discharge (e.g., warnings, restrictions, closures, or mass mortalities) or will they be impacted adversely by the modified discharge?

4. Does the current or modified discharge cause the following within or beyond the ZID: [40 CFR 125.61(c)(3)]

a. Mass mortality of fishes or invertebrates due to oxygen depletion, high concentrations of toxics or other conditions?

b. An increased incidence of disease in marine organisms?

c. An abnormal body burden of any toxic material in marine organisms?

d. Any other extreme, adverse biological impacts?

5. For discharges into saline estuarine waters: [40 CFR 125.61(c)(4)]

a. Does or will the current or modified discharge cause substantial differences in the benthic population within the ZID and beyond the ZID?

b. Does or will the current or modified discharge interfere with migratory pathways within the ZID?

c. Does or will the current or modified discharge result in bioaccumulation of toxic pollutants or pesticides at levels which exert adverse effects on the biota within the ZID?

6. For improved discharges, will the proposed improved discharge(s) comply with the requirements of 40 CFR 125.61(a) through 125.61(d)? [40 CFR 125.61(e)]

7. For altered discharge(s), will the altered discharge(s) comply with the requirements of 40 CFR 125.61(a) through 125.61(d)? [40 CFR 125.61(e)]

8. If your current discharge is to stressed waters, does or will your current or modified discharges: [40 CFR 125.61(f)]

a. Contribute to, increase, or perpetuate such stressed condition?

b. Contribute to further degradation of the biota or water quality if the level of human perturbation from other sources increases?

c. Retard the recovery of the biota or water quality if human perturbation from other sources decreases?

E. *Impacts of Discharge on Recreational Activities* [40 CFR 125.61(d)]:

1. Describe the existing or potential recreational activities likely to be affected by the modified discharge(s) beyond the zone of initial dilution.

2. What are the existing and potential impacts of the modified discharge(s) on recreational activities? Your answer should include, but not be limited to, a discussion of fecal coliforms.

3. Are there any Federal, State or local restrictions on recreational activities in the vicinity of the modified discharge(s)? If yes, describe the restrictions and provide citations to available references.

4. If recreational restrictions exist, would such restrictions be lifted or modified if you were discharging a secondary treatment effluent?

F. *Establishment of a Monitoring Program* (40 CFR 125.62):

1. Describe the biological, water quality, and effluent monitoring programs which you propose to meet the criteria of 40 CFR 125.62.

2. Describe the sampling techniques, schedules, and locations, analytical techniques, quality control and verification procedures to be used.

3. Describe the personnel and financial resources available to implement the monitoring programs upon issuance of a modified permit and to carry it out for the life of the modified permit.

G. *Effect of Discharge on Other Point and Nonpoint Sources* (40 CFR 125.63):

1. Does (will) your modified discharge(s) cause additional treatment or control requirements for any other point or nonpoint pollution source(s)?

2. Provide the determination required by 40 CFR 125.63(b) or, if the determination has not yet been received, a copy of a letter to the appropriate agency(s) requesting the required determination.

H. *Toxics Control Program* (40 CFR 125.64):

1. a. Do you have any known or suspected industrial sources of toxic pollutants or pesticides?

b. If no, provide the certification required by 40 CFR 125.64(c)(2).

2. Provide the results of wet and dry weather effluent analyses for toxic pollutants and pesticides as required by 40 CFR 125.64(a)(1).

3. Provide an analysis of known or suspected industrial sources of toxic pollutants and pesticides identified in 2. above.

4. Do you have an approved industrial pretreatment program?

a. If yes, provide the date of EPA approval.

b. If no, and if required by 40 CFR Part 403 to have an industrial pretreatment program, provide a proposed schedule for development and implementation of your industrial pretreatment program to meet the requirements of 40 CFR Part 403.

5. Describe the public education program you propose to minimize the entrance of nonindustrial toxic pollutants and pesticides into your treatment system.

6. Provide a schedule for development and implementation of a nonindustrial toxics control program to meet the requirements of 40 CFR 125.64(d)(3).

(Approved by the Office of Management and Budget under control number 2000-0427)

[47 FR 53675, Nov. 26, 1982, as amended at 48 FR 31404, July 8, 1983]

Subpart H—Criteria for Determining Alternative Effluent Limitations Under Section 316(a) of the Act

§ 125.70 Purpose and scope.

Section 316(a) of the Act provides that:

> "With respect to any point source otherwise subject to the provisions of section 301 or section 306 of this Act, whenever the owner or operator of any such source, after opportunity for public hearing, can demonstrate to the satisfaction of the Administrator (or, if appropriate, the State) that any effluent limitation proposed for the control of the thermal component of any discharge from such source will require effluent limitations more stringent than necessary to assure the projection [sic] and propagation of a balanced, indigenous population of shellfish, fish and wildlife in and on the body of water into which the discharge is to be made, the Administrator (or, if appropriate, the State) may impose an effluent limitation under such sections on such plant, with respect to the thermal component of such discharge (taking into account the interaction of such thermal component with other pollutants), that will assure the protection and propagation of a balanced indigenous population of shellfish, fish and wildlife in and on that body of water."

This subpart describes the factors, criteria and standards for the establishment of alternative thermal effluent limitations under section 316(a) of the Act in permits issued under section 402(a) of the Act.

§ 125.71 Definitions.

For the purpose of this subpart:

(a) "Alternative effluent limitations" means all effluent limitations or standards of performance for the control of the thermal component of any discharge which are established under section 316(a) and this subpart.

(b) "Representative important species" means species which are representative, in terms of their biological needs, of a balanced, indigenous community of shellfish, fish and wildlife in the body of water into which a discharge of heat is made.

(c) The term "balanced, indigenous community" is synonymous with the term "balanced, indigenous population" in the Act and means a biotic community typically characterized by diversity, the capacity to sustain itself through cyclic seasonal changes, presence of necessary food chain species and by a lack of domination by pollution tolerant species. Such a community may include historically non-native species introduced in connection with a program of wildlife management and species whose presence or abundance results from substantial, irreversible environmental modifications. Normally, however, such a community will not include species whose presence or abundance is attributable to the introduction of pollutants that will be eliminated by compliance by all sources with section 301(b)(2) of the Act; and may not include species whose presence or abundance is attributable to alternative effluent limitations imposed pursuant to section 316(a).

§ 125.72 Early screening of applications for section 316(a) variances.

(a) Any initial application for a section 316(a) variance shall include the following early screening information:

(1) A description of the alternative effluent limitation requested;

(2) A general description of the method by which the discharger proposes to demonstrate that the otherwise applicable thermal discharge effluent limitations are more stringent than necessary;

(3) A general description of the type of data, studies, experiments and other information which the discharger intends to submit for the demonstration; and

(4) Such data and information as may be available to assist the Director

in selecting the appropriate representative important species.

(b) After submitting the early screening information under paragraph (a) of this section, the discharger shall consult with the Director at the earliest practicable time (but not later than 30 days after the application is filed) to discuss the discharger's early screening information. Within 60 days after the application is filed, the discharger shall submit for the Director's approval a detailed plan of study which the discharger will undertake to support its section 316(a) demonstration. The discharger shall specify the nature and extent of the following type of information to be included in the plan of study: Biological, hydrographical and meteorological data; physical monitoring data; engineering or diffusion models; laboratory studies; representative important species; and other relevant information. In selecting representative important species, special consideration shall be given to species mentioned in applicable water quality standards. After the discharger submits its detailed plan of study, the Director shall either approve the plan or specify any necessary revisions to the plan. The discharger shall provide any additional information or studies which the Director subsequently determines necessary to support the demonstration, including such studies or inspections as may be necessary to select representative important species. The discharger may provide any additional information or studies which the discharger feels are appropriate to support the demonstration.

(c) Any application for the renewal of a section 316(a) variance shall include only such information described in paragraphs (a) and (b) of this section and § 124.73(c)(1) as the Director requests within 60 days after receipt of the permit application.

(d) The Director shall promptly notify the Secretary of Commerce and the Secretary of the Interior, and any affected State of the filing of the request and shall consider any timely recommendations they submit.

(e) In making the demonstration the discharger shall consider any information or guidance published by EPA to assist in making such demonstrations.

(f) If an applicant desires a ruling on a section 316(a) application before the ruling on any other necessary permit terms and conditions, (as provided by § 124.65), it shall so request upon filing its application under paragraph (a) of this section. This request shall be granted or denied at the discretion of the Director.

NOTE: At the expiration of the permit, any discharger holding a section 316(a) variance should be prepared to support the continuation of the variance with studies based on the discharger's actual operation experience.

[44 FR 32948, June 7, 1979, as amended at 45 FR 33513, May 19, 1980]

§ 125.73 Criteria and standards for the determination of alternative effluent limitations under section 316(a).

(a) Thermal discharge effluent limitations or standards established in permits may be less stringent than those required by applicable standards and limitations if the discharger demonstrates to the satisfaction of the director that such effluent limitations are more stringent than necessary to assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is made. This demonstration must show that the alternative effluent limitation desired by the discharger, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected, will assure the protection and propagation of a balanced indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is to be made.

(b) In determining whether or not the protection and propagation of the affected species will be assured, the Director may consider any information contained or referenced in any applicable thermal water quality criteria and thermal water quality information published by the Administrator under section 304(a) of the Act, or any other information he deems relevant.

(c)(1) Existing dischargers may base their demonstration upon the absence of prior appreciable harm in lieu of predictive studies. Any such demonstrations shall show:

(i) That no appreciable harm has resulted from the normal component of the discharge (taking into account the interaction of such thermal component with other pollutants and the additive effect of other thermal sources to a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge has been made; or

(ii) That despite the occurrence of such previous harm, the desired alternative effluent limitations (or appropriate modifications thereof) will nevertheless assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is made.

(2) In determining whether or not prior appreciable harm has occurred, the Director shall consider the length of time in which the applicant has been discharging and the nature of the discharge.

Subpart I—Criteria Applicable to Cooling Water Intake Structures Under Section 316(b) of the Act—[Reserved]

Subpart J—Criteria for Extending Compliance Dates Under Section 301(i) of the Act

§ 125.90 Purpose and scope.

Under section 301(i) (1) and (2) of the Act, extensions of the 1977 statutory deadline for compliance with certain treatment requirements may be granted by the Director through permit issuance or modification. This subpart establishes criteria for granting these extensions and the method for incorporating these extensions into permits issued under section 402(a) of the Act.

§ 125.91 Definition.

For purposes of this subpart, "construction" includes any one of the following: Preliminary planning to determine the feasibility of treatment works; engineering, architectural, legal fiscal, or economic investigations or studies, surveys, designs, plans, working drawings, specifications, procedures, or other necessary actions, erection, building, acquisition, alteration, remodeling, improvement, or extension of treatment works, or the inspection or supervision of any of the foregoing items, *Provided:* That, completion of the facility and attainment of operational level by no later than July, 1, 1983, is a reasonable expectation.

§ 125.92 Requests for permit modification and issuance under section 301(i)(1) of the Act.

Any owner or operator of a publicly owned treatment works (POTW) that requires construction to achieve limitations under section 301(b)(1)(B) or 301(b)(1)(C) of the Act may request modification or issuance of a permit extending the date for compliance with these limitations in accordance with the provisions of § 122.21(m).

(Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act: 42 U.S.C. 6905, 6912, 6925, 6927, 6974)

[45 FR 33513, May 19, 1980, as amended at 48 FR 14293, Apr. 1, 1983]

§ 125.93 Criteria for permit modification and issuance under section 301(i)(1) of the Act.

No request for a permit modification or issuance under section 301(i)(1) shall be granted unless the Director finds that the POTW requires construction to achieve limitations under section 301(b)(1)(B) or 301(b)(1)(C) of the Act and did not complete construction for either of the following reasons:

(a) The issuance of a notice to proceed under a construction contract for any segment of Step 3 project work (or if notice to proceed is not required, the execution of the construction contract) occurred before July 1, 1977, but construction could not physically be completed by July 1, 1977, despite all expeditious efforts of the POTW (see initiation of construction as defined in 40 CFR 35.905 for Step 3); or

(b) Federal financial assistance was not available, or was not available in time for construction required to achieve these limitations, and the POTW did not in any significant way contribute to this unavailability or delay.

§ 125.94 Permit terms and conditions under section 301(i)(1) of the Act.

(a) All permits modified or issued by the Director under section 301(i)(1) of the Act shall contain at a minimum the following permit terms and conditions:

(1) The shortest reasonable schedule of compliance for achievement of limitations under section 301(b)(1) (B) and (C) but in no event later than July 1, 1983. This schedule shall be based upon the earliest date that Federal financial assistance will be available and construction can be completed and on any additional information submitted by the POTW or otherwise available.

(i) When a facility plan has been approved in accordance with 40 CFR Part 35, Subpart E, this schedule shall contain dates certain for the completion of actions leading toward the attainment of statutory treatment limitations.

(ii) When the POTW has not completed Step 1 of the construction grants process in accordance with 40 CFR Part 35, Subpart E, this schedule shall contain a date certain for the submission of a facility plan (completion of Step 1) upon which date the permit should be set to expire. In this case, in order to assure compliance by the POTW by July 1, 1983, the following requirements must be met:

(A) Certification by the State, based on its one or five year project priority list developed pursuant to 40 CFR 35.915(c), that funding will be available in time to ensure compliance by July 1, 1983; and

(B) Reporting once a year (if necessary) by the POTW as to its progress in obtaining Federal funding.

[*Comment:* EPA recognizes that the date for submission of the facility plan may not take into account all the uncertainties of the Step 1 planning process. Because of the uncertainties inherent in the Step 1 planning process, EPA recommends that section 301(i)(1) requests (and permit issuance) for projects that are presently in Step 2 or should be acted on *before* requests from projects in Step 1. When Federal funding in the form of a Step 2 construction grant award is made available, and the Step permit has expired, the permit is to be reissued containing a date certain schedule derived from the facility plan and coordinated with the State Project Priority List.]

(2) A statement ensuring compliance with requirements under section 20 (b) through (g) of the Act consistent with the terms of the POTWs construction grant.

(3) Abatement practices and interim effluent limitations reflecting optimum operation and maintenance o the existing facilities. These shall include:

(i) Adequate operator staffing and training;

(ii) Adequate laboratory and proces controls; and

(iii) Effluent limitations derived from reports of operation and maintenance inspections conducted by EPA or the State, or other guidance.

[*Comment:* Only in exceptional circumstances should in-depth plant evaluations b conducted, e.g., when existing informatio does not represent the true capabilities o the plant.]

(4) Interim effluent limitations reflecting other non-capital intensiv measures for increased pollution control. This shall include any possibl minor facility modifications such a piping changes, additional meterin and instrumentation or the use o skimming and vacuuming equipment When an existing POTW is currentl violating limitations imposed unde section 301(b)(1)(C) of the Act, interim effluent limitations shall be established to minimize adverse water quality impact; these limitations shall no be made less stringent or allow mor pollutants to be discharged than ar currently being discharged during th term of an extension granted unde section 301(i)(1) of the Act.

(b) If a POTW has industrial users any permit issued or modified by th Director under section 301(i)(1) sha contain any terms and conditions necessary to ensure compliance with 4 CFR Part 403.

§ 125.95 Requests for permit modification or issuance under section 301(i)(2) of the Act.

Any owner or operator of a point source other than a POTW that will not achieve the requirements of section 301(b)(1) (A) and (C) of the Act because it was scheduled to discharge into a POTW that is presently unable to accept the discharge without construction, may request modification or issuance of a permit extending the date of compliance with these limitations in accordance with the provisions of § 122.21(l).

(Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act: 42 U.S.C. 6905, 6912, 6925, 6927, 6974)

[45 FR 33513, May 19, 1980, as amended at 48 FR 14293, Apr. 1, 1983]

§ 125.96 Criteria for permit modification or issuance under section 301(i)(2) of the Act.

No request for a permit modification or issuance under section 301(i)(2) of the Act shall be granted unless the Director finds that the discharger has failed to achieve the requirements of section 301(b)(1) (A) and (C) of the Act because it was scheduled to discharge into a POTW that is presently unable to accept the discharge without construction, and:

(a) The discharger has indicated an intent to discharge into the POTW before July 1, 1977, in one of the following ways:

(1) The discharger was issued a permit before July 1, 1977, based upon a discharge into a POTW;

(2) The discharger had a binding contractual obligation before July 1, 1977, (enforceable against the discharger) to discharge into a POTW. Contracts which can be terminated or modified without substantial loss and contracts for feasibility, engineering and design studies do not constitute a contractual obligation under this paragraph.

(3) A construction grant application made by the POTW before July 1, 1977, clearly demonstrated that the discharger was to discharge into the POTW; or

(4) Engineering plans, architectural plans or working drawings prepared for the POTW before July 1, 1977, clearly demonstrated the discharger was to discharge into the POTW. Plans and drawings, such as those accompanying a bona fide application for a Federal construction grant, are sufficient only to the extent that they were truly representative of the intent of the discharger and the POTW;

(b) The Director finds that the discharger has acted in good faith in its efforts to effectuate discharge into the POTW and to minimize or abate pollution prior to discharge into the POTW. This shall include the following findings:

(1) Failure of the discharger to meet the July 1, 1977, deadline was for reasons beyond its control;

(2) A history of a high degree of commitment to meet the requirements of the Act as manifested by cooperation with the State or EPA in attempting to resolve disputed issues;

(3) No history of unjustified delay;

(4) No past serious or intentional violations of the Act; and

(5) All reasonable measures are being taken to expedite compliance.

[*Comment:* The Director may also consider whether the discharger has operated its facilities competently and responsibly and the extent to which the discharger has completed the necessary prerequisites to having its waste treated by the POTW.]

(c) The POTW will be in operation and available to the discharger July 1, 1983;

(d) The POTW will be able to meet secondary treatment and water quality standard effluent limitations by July 1, 1983, after receiving the waste from the discharger;

(e) The discharger and the POTW have entered into an enforceable contract providing that:

(i) The discharger agrees to discharge its waste to the POTW;

(ii) The POTW agrees to accept and treat that waste by a date certain; and

(iii) The discharger agrees to pay all user charges and industrial cost recovery charges required under section 204 of the Act; and

(f) In the case of a discharge into an existing POTW, such POTW has been granted an extension under section 301(i)(1) of the Act.

§ 125.97 Permit terms and conditions under section 301(i)(2) of the Act.

All permits modified or issued by the Director under section 301(i)(2) of the Act shall contain at a minimum the following permit terms and conditions:

(a) The shortest reasonable schedule of compliance leading to discharge into the POTW, not to extend beyond the earliest date practicable for compliance, or beyond the final compliance date of any extension granted to the appropriate POTW under section 301(i)(1) of the Act, but in no event later than July 1, 1983. This schedule shall be based upon the earliest date by which the appropriate POTW can receive the waste from the discharger and the discharger can complete the necessary prerequisites to having its waste treated by that POTW.

(b) Achievement of effluent limitations and standards under section 301(b)(1) (A) and (C) of the Act by the same final date in the schedule established in paragraph (a) of this section in the event that the permittee does not discharge its wastes to the POTW by the date established under paragraph (a) of this section.

(c) Abatement practices and interim effluent limitations reflecting optimum operation and maintenance of the discharger's existing facilities. These shall include:

(1) Effective performance of facility design removals;

(2) Adequate operator staffing and training; and

(3) Adequate laboratory and process control.

(d) Interim effluent limitations reflecting other non-capital intensive measures for increased pollution control.

(e) Requirements to meet applicable toxic effluent standards and prohibitions after they are promulgated under section 307(a) of the Act.

(f) Requirements to ensure compliance with:

(1) Pretreatment requirements imposed by the POTW pursuant to any extension granted to the POTW under section 301(i)(1);

(2) Any State or local pretreatment requirements; and

(3) Pretreatment standards as promulgated under section 307(b) of the Act.

[*Comment:* The legislative history cites the following example: "[I]f an industry is planning on participating in a municipal system which will not be available until January 1983, that industry would still have to install and operate pretreatment facilitie within the time specified for compliance a the time the applicable pretreatment standard was promulgated and in no event late than three years from the date of said promulgation. Thus, if the pretreatment regulations are promulgated March 1, 1979, an require compliance within two years, tha industry would be required to comply b March 1, 1981," H.R. Rep. No. 95-830, 95th Cong., 1st Sess., 12712 (daily ed. Dec. 1977).]

(g) Any water conservation requirements necessary to carry out the provisions of the Act or imposed by th POTW pursuant to the contract executed between the discharger and th POTW.

[*Comment:* The existence of such a contrac is a prerequisite to granting an extensio under section 301(i)(2)(B) of the Act an § 125.96(e).]

Subpart K—Criteria and Standard for Best Management Practice Authorized Under Section 304(of the Act

§ 125.100 Purpose and scope.

This subpart describes how bes management practices (BMPs) for ancillary industrial activities under section 304(e) of the Act shall be reflected in permits, including best management practices promulgated in effluent limitations under section 304 an established on a case-by-case basis i permits under section 402(a)(1) of th Act. Best management practices authorized by section 304(e) are include in permits as requirements for th purposes of section 301, 302, 306, 30 or 403 of the Act, as the case may b

§ 125.101 Definition.

"Manufacture" means to produce an intermediate or final product, by-product.

§ 125.102 Applicability of best management practices.

Dischargers who use, manufacture, store, handle or discharge any pollutant listed as toxic under section 307(a)(1) of the Act or any pollutant listed as hazardous under section 311 of the Act are subject to the requirements of this Subpart for all activities which may result in significant amounts of those pollutants reaching waters of the United States. These activities are ancillary manufacturing operations including: Materials storage areas; in-plant transfer, process and material handling areas; loading and unloading operations; plant site runoff; and sludge and waste disposal areas.

§ 125.103 Permit terms and conditions.

(a) Best management practices shall be expressly incorporated into a permit where required by an applicable EPA promulgated effluent limitations guideline under section 304(e);

(b) Best management practices may be expressly incorporated into a permit on a case-by-case basis where determined necessary to carry out the provisions of the Act under section 402(a)(1). In issuing a permit containing BMP requirements, the Director shall consider the following factors:

(1) Toxicity of the pollutant(s);

(2) Quantity of the pollutant(s) used, produced, or discharged;

(3) History of NPDES permit violations;

(4) History of significant leaks or spills of toxic or hazardous pollutants;

(5) Potential for adverse impact on public health (e.g., proximity to a public water supply) or the environment (e.g., proximity to a sport or commerical fishery); and

(6) Any other factors determined to be relevant to the control of toxic or hazardous pollutants.

(c) Best management practices may be established in permits under paragraph (b) of this section alone or in combination with those required under paragraph (a) of this section.

(d) In addition to the requirements of paragraphs (a) and (b) of this section, dischargers covered under § 125.102 shall develop and implement a best management practices program in accordance with § 125.104 which prevents, or minimizes the potential for, the release of toxic or hazardous pollutants from ancillary activities to waters of the United States.

§ 125.104 Best management practices programs.

(a) BMP programs shall be developed in accordance with good engineering practices and with the provisions of this subpart.

(b) The BMP program shall:

(1) Be documented in narrative form, and shall include any necessary plot plans, drawings or maps;

(2) Establish specific objectives for the control of toxic and hazardous pollutants.

(i) Each facility component or system shall be examined for its potential for causing a release of significant amounts of toxic or hazardous pollutants to waters of the United States due to equipment failure, improper operation, natural phenomena such as rain or snowfall, etc.

(ii) Where experience indicates a reasonable potential for equipment failure (e.g., a tank overflow or leakage), natural condition (e.g., precipitation), or other circumstances to result in significant amounts of toxic or hazardous pollutants reaching surface waters, the program should include a prediction of the direction, rate of flow and total quantity of toxic or hazardous pollutants which could be discharged from the facility as a result of each condition or circumstance;

(3) Establish specific best management practices to meet the objectives identified under paragraph (b)(2) of this section, addressing each component or system capable of causing a release of significant amounts of toxic or hazardous pollutants to the waters of the United States;

(4) *The BMP program:* (i) May reflect requirements for Spill Prevention Control and Countermeasure (SPCC) plans under section 311 of the Act and 40 CFR Part 151, and may incorporate any part of such plans into the BMP program by reference;

[*Comment:* EPA has proposed section 311(j)(1)(c) regulations (43 FR 39276) which require facilities subject to NPDES to develop and implement SPCC plans to prevent discharges of reportable quantities of designated hazardous substances. While Subpart K requires only procedural activities and minor construction, the proposed 40 CFR Part 151 (SPCC regulations) are more stringent and comprehensive with respect to their requirements for spill prevention. In developing BMP programs in accordance with Subpart K, owners or operators should also consider the requirements of proposed 40 CFR Part 151 which may address many of the same areas of the facility covered by this Subpart.]

(ii) Shall assure the proper management of solid and hazardous waste in accordance with regulations promulgated under the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976 (RCRA) (40 U.S.C. 6901 *et seq*). Management practices required under RCRA regulations shall be expressly incorporated into the BMP program; and

(iii) Shall address the following points for the ancillary activities in § 125.102:

(A) Statement of policy;

(B) Spill Control Committee;

(C) Material inventory;

(D) Material compatibility;

(E) Employee training:

(F) Reporting and notification procedures;

(G) Visual inspections;

(H) Preventive maintenance;

(I) Housekeeping; and

(J) Security.

[*Comment:* Additional technical information on BMPs and the elements of a BMP program is contained in a publication entitled "NPDES Best Management Practices Guidance Document." Copies may be obtained by written request to Edward A. Kramer (EN-336), Office of Water Enforcement, Environmental Protection Agency, Washington, DC, 20460.]

(c)(1) The BMP program must be clearly described and submitted as part of the permit application. An application which does not contain a BMP program shall be considered incomplete. Upon receipt of the application, the Director shall approve or modify the program in accordance with the requirements of this subpart. The BMP program as approved or modified shall be included in the draft permit (§ 124.6). The BMP program shall be subject to the applicable permit issuance requirements of Part 124, resulting in the incorporation of the program (including any modifications of the program resulting from the permit issuance procedures) into the final permit.

(2) Proposed modifications to the BMP program which affect the discharger's permit obligations shall be submitted to the Director for approval. If the Director approves the proposed BMP program modification, the permit shall be modified in accordance with § 122.62, provided that the Director may waive the requirements for public notice and opportunity for hearing on such modification if he or she determines that the modification is not significant. The BMP program, or modification thereof, shall be fully implemented as soon as possible but not later than one year after permit issuance, modification, or revocation and reissuance unless the Director specifies a later date in the permit.

NOTE: A later date may be specified in th permit, for example, to enable coordinated preparation of the BMP program required under these regulations and the SPCC pla required under 40 CFR Part 151 or to allo for the completion of construction projec related to the facility's BMP or SPCC pr gram.

(d) The discharger shall maintain description of the BMP program the facility and shall make the d scription available to the Directo upon request.

(e) The owner or operator of a facil ty subject to this subpart shall amen the BMP program in accordance wit the provisions of this subpart whe ever there is a change in facilit design, construction, operation, maintenance which materially affec the facility's potential for discharge significant amounts of hazardous toxic pollutants into the waters of th United States.

(f) If the BMP program proves to ineffective in achieving the general o jective of preventing the release of s nificant amounts of toxic or hazardo pollutants to those waters and the sp cific objectives and requiremen under paragraph (b) of this sectio the permit and/or the BMP progra shall be subject to modification to incorporate revised BMP requirements.

(Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act: 42 U.S.C. 6905, 6912, 6925, 6027, 6974)

[44 FR 32948, June 7, 1979, as amended at 45 FR 33513, May 19, 1980; 48 FR 14293, Apr. 1, 1983]

Subpart L—Criteria and Standards for Imposing Conditions for the Disposal of Sewage Sludge Under Section 405 of the Act [Reserved]

Subpart M—Ocean Discharge Criteria

SOURCE: 45 FR 65953, Oct. 3, 1980, unless otherwise noted.

§125.120 Scope and purpose.

This subpart establishes guidelines for issuance of National Pollutant Discharge Elimination System (NPDES) permits for the discharge of pollutants from a point source into the territorial seas, the contiguous zone, and the oceans.

§125.121 Definitions.

(a) "Irreparable harm" means significant undesirable effects occurring after the date of permit issuance which will not be reversed after cessation or modification of the discharge.

(b) "Marine environment" means that territorial seas, the contiguous zone and the oceans.

(c) "Mixing zone" means the zone extending from the sea's surface to seabed and extending laterally to a distance of 100 meters in all directions from the discharge point(s) or to the boundary of the zone of initial dilution as calculated by a plume model approved by the director, whichever is greater, unless the director determines that the more restrictive mixing zone r another definition of the mixing one is more appropriate for a specific discharge.

(d) "No reasonable alternatives" means:

(1) No land-based disposal sites, disharge point(s) within internal waters, r approved ocean dumping sites ithin a reasonable distance of the site of the proposed discharge the use of which would not cause unwarranted economic impacts on the discharger, or, notwithstanding the availability of such sites,

(2) On-site disposal is environmentally preferable to other alternative means of disposal after consideration of:

(i) The relative environmental harm of disposal on-site, in disposal sites located on land, from discharge point(s) within internal waters, or in approved ocean dumping sites, and

(ii) The risk to the environment and human safety posed by the transportation of the pollutants.

(e) "Unreasonable degradation of the marine environment" means: (1) Significant adverse changes in ecosystem diversity, productivity and stability of the biological community within the area of discharge and surrounding biological communities,

(2) Threat to human health through direct exposure to pollutants or through consumption of exposed aquatic organisms, or

(3) Loss of esthetic, recreational, scientific or economic values which is unreasonable in relation to the benefit derived from the discharge.

§ 125.122 Determination of unreasonable degradation of the marine environment.

(a) The director shall determine whether a discharge will cause unreasonable degradation of the marine environment based on consideration of:

(1) The quantities, composition and potential for bioaccumulation or persistence of the pollutants to be discharged;

(2) The potential transport of such pollutants by biological, physical or chemical processes;

(3) The composition and vulnerability of the biological communities which may be exposed to such pollutants, including the presence of unique species or communities of species, the presence of species identified as endangered or threatened pursuant to the Endangered Species Act, or the presence of those species critical to the structure or function of the eco-

system, such as those important for the food chain;

(4) The importance of the receiving water area to the surrounding biological community, including the presence of spawning sites, nursery/forage areas, migratory pathways, or areas necessary for other functions or critical stages in the life cycle of an organism.

(5) The existence of special aquatic sites including, but not limited to marine sanctuaries and refuges, parks, national and historic monuments, national seashores, wilderness areas and coral reefs;

(6) The potential impacts on human health through direct and indirect pathways;

(7) Existing or potential recreational and commercial fishing, including finfishing and shellfishing;

(8) Any applicable requirements of an approved Coastal Zone Management plan;

(9) Such other factors relating to the effects of the discharge as may be appropriate;

(10) Marine water quality criteria developed pursuant to section 304(a)(1).

(b) Discharges in compliance with section 301(g), 301(h), or 316(a) variance requirements or State water quality standards shall be presumed not to cause unreasonable degradation of the marine environment, for any specific pollutants or conditions specified in the variance or the standard.

§ 125.123 Permit requirements.

(a) If the director on the basis of available information including that supplied by the applicant pursuant to § 125.124 determines prior to permit issuance that the discharge will not cause unreasonable degradation of the marine environment after application of any necessary conditions specified in § 125.123(d), he may issue an NPDES permit containing such conditions.

(b) If the director, on the basis of available information including that supplied by the applicant pursuant to § 125.124 determines prior to permit issuance that the discharge will cause unreasonable degradation of the marine environment after application of all possible permit conditions specified in § 125.123(d), he may not issue an NPDES permit which authorizes the discharge of pollutants.

(c) If the director has insufficient information to determine prior to permit issuance that there will be no unreasonable degradation of the marine environment pursuant to § 125.122, there shall be no discharge of pollutants into the marine environment unless the director on the basis of available information, including that supplied by the applicant pursuant to § 125.124 determines that:

(1) Such discharge will not cause irreparable harm to the marine environment during the period in which monitoring is undertaken, and

(2) There are no reasonable alternatives to the on-site disposal of these materials, and

(3) The discharge will be in compliance with all permit conditions established pursuant to paragraph (d) of this section.

(d) All permits which authorize the discharge of pollutants pursuant to paragraph (c) of this section shall:

(1) Require that a discharge of pollutants will: (i) Following dilution as measured at the boundary of the mixing zone not exceed the limiting permissible concentration for the liquid and suspended particulate phases of the waste material as described in § 227.27(a) (2) and (3), § 227.27(b), and § 227.27(c) of the Ocean Dumping Criteria; and (ii) not exceed the limiting permissible concentration for the solid phase of the waste material or cause an accumulation of toxic materials in the human food chain as described in § 227.27 (b) and (d) of the Ocean Dumping Criteria;

(2) Specify a monitoring program, which is sufficient to assess the impact of the discharge on water, sediment, and biological quality including, where appropriate, analysis of the bioaccumulative and/or persistent impact on aquatic life of the discharge;

(3) Contain any other conditions, such as performance of liquid or suspended particulate phase bioaccumulation tests, seasonal restrictions on discharge, process modifications, dispersion of pollutants, or schedule of compliance for existing discharges,

which are determined to be necessary because of local environmental conditions, and

(4) Contain the following clause: In addition to any other grounds specified herein, this permit shall be modified or revoked at any time if, on the basis of any new data, the director determines that continued discharges may cause unreasonable degradation of the marine environment.

§ 125.124 Information required to be submitted by applicant.

The applicant is responsible for providing information which the director may request to make the determination required by this subpart. The director may require the following information as well as any other pertinent information:

(a) An analysis of the chemical constituents of any discharge;

(b) Appropriate bioassays necessary to determine the limiting permissible concentrations for the discharge;

(c) An analysis of initial dilution;

(d) Available process modifications which will reduce the quantities of pollutants which will be discharged;

(e) Analysis of the location where pollutants are sought to be discharged, including the biological community and the physical description of the discharge facility;

(f) Evaluation of available alternatives to the discharge of the pollutants including an evaluation of the possibility of land-based disposal or disposal in an approved ocean dumping site.

PART 129—TOXIC POLLUTANT EFFLUENT STANDARDS

Subpart A—Toxic Pollutant Effluent Standards and Prohibitions

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AUTHORITY: Secs. 307, 308, 501, Federal Water Pollution Control Act Amendments of 1972 (Pub. L. 92-500, 86 Stat. 816, (33 U.S.C. 1251 *et seq.*)).

SOURCE: 42 FR 2613, Jan. 12, 1977, unless otherwise noted.

Subpart A—Toxic Pollutant Effluent Standards and Prohibitions

§ 129.1 Scope and purpose.

(a) The provisions of this subpart apply to owners or operators of specified facilities discharging into navigable waters.

(b) The effluent standards or prohibitions for toxic pollutants established in this subpart shall be applicable to the sources and pollutants hereinafter set forth, and may be incorporated in any NPDES permit, modification or renewal thereof, in accordance with the provisions of this subpart.

(c) The provisions of 40 CFR Parts 124 and 125 shall apply to any NPDES permit proceedings for any point source discharge containing any toxic pollutant for which a standard or prohibition is established under this part.

§ 129.2 Definitions.

All terms not defined herein shall have the meaning given them in the Act or in 40 CFR Part 124 or 125. As used in this part, the term:

(a) "Act" means the Federal Water Pollution Control Act, as amended (Pub. L. 92-500, 86 Stat. 816 *et seq.*, 33 U.S.C.1251 *et seq.*). Specific references to sections within the Act will be according to Pub. L. 92-500 notation.

(b) "Administrator" means the Administrator of the Environmental Protection Agency or any employee of the Agency to whom the Administrator may by order delegate the authority to carry out his functions under section 307(a) of the Act, or any person who shall by operation of law be authorized to carry out such functions.

(c) "Effluent standard" means, for purposes of section 307, the equivalent of "effluent limitation" as that term is defined in section 502(11) of the Act with the exception that it does not include a schedule of compliance.

(d) "Prohibited" means that the constituent shall be absent in any discharge subject to these standards, as determined by any analytical method.

(e) "Permit" means a permit for the discharge of pollutants into navigable waters under the National Pollutant Discharge Elimination System established by section 402 of the Act and implemented in regulations in 40 CFR Parts 124 and 125.

(f) "Working day" means the hours during a calendar day in which a facility discharges effluents subject to this part.

(g) "Ambient water criterion" means that concentration of a toxic pollutant in a navigable water that, based upon available data, will not result in adverse impact on important aquatic life, or on consumers of such aquatic life, after exposure of that aquatic life for periods of time exceeding 96 hours and continuing at least through one reproductive cycle; and will not result in a significant risk of adverse health effects in a large human population based on available information such as mammalian laboratory toxicity data, epidemiological studies of human occupational exposures, or human exposure data, or any other relevant data.

(h) "New source" means any source discharging a toxic pollutant, the construction of which is commenced after proposal of an effluent standard or prohibition applicable to such source if such effluent standard or prohibition is thereafter promulgated in accordance with section 307.

(i) "Existing source" means any source which is not a new source as defined above.

(j) "Source" means any building, structure, facility, or installation from which there is or may be the discharge of toxic pollutants designated as such by the Administration under section 307(a)(1) of the Act.

(k) "Owner or operator" means any person who owns, leases, operates, controls, or supervises a source as defined above.

(l) "Construction" means any placement, assembly, or installation of facilities or equipment (including contractual obligations to purchase such facilities or equipment) at the premises where such equipment will be used, including preparation work at such premises.

(m) "Manufacturer" means any establishment engaged in the mechanical or chemical transformation of materials or substances into new products including but not limited to the blending of materials such as pesticidal products, resins, or liquors.

(n) "Process wastes" means any designated toxic pollutant, whether in wastewater or otherwise present, which is inherent to or unavoidably resulting from any manufacturing process, including that which comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, by-product or waste product and is discharged into the navigable waters.

(o) "Air emissions" means the release or discharge of a toxic pollutant by an owner or operator into the ambient air either (1) by means of a stack or (2) as a fugitive dust, mist or vapor as a result inherent to the manufacturing or formulating process.

(p) "Fugitive dust, mist or vapor" means dust, mist or vapor containing a toxic pollutant regulated under this part which is emitted from any source other than through a stack.

(q) "Stack" means any chimney, flue, conduit, or duct arranged to conduct emissions to the ambient air.

(r) "Ten year 24-hour rainfall event" means the maximum precipitation event with a probable recurrence interval of once in 10 years as defined by the National Weather Service in Technical Paper No. 40, "Rainfall Frequency Atlas of the United States," May 1961, and subsequent amendments or equivalent regional or State rainfall probability information developed therefrom.

(s) "State Director" means the chief administrative officer of a State or interstate water pollution control agency operating an approved NPDES permit program. In the event responsibility for water pollution control and enforcement is divided among two or more State or interstate agencies, the term "State Director" means the administrative officer authorized to perform the particular procedure to which reference is made.

§ 129.3 Abbreviations.

The abbreviations used in this part represent the following terms:

lb=pound (or pounds).
g=gram.
µg/l=micrograms per liter (1 one-millionth gram/liter).
kg=kilogram(s).
kkg=1000 kilogram(s).

§ 129.4 Toxic pollutants.

The following are the pollutants subject to regulation under the provisions of this subpart:

(a) Aldrin/Dieldrin—"Aldrin" means the compound aldrin as identified by the chemical name, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro - 1,4 - endo-5,8-exo-dimethanonaphthalene; "Dieldrin" means the compound dieldrin as identified by the chemical name 1,2,3,4,10,10-hexachloro - 6,7 - epoxy - 1,4,4a,5,6,7,8,8a-octahydro-1,4-endo-5,8-exo-dimethanonaphthalene.

(b) DDT—"DDT" means the compounds DDT, DDD, and DDE as identified by the chemical names: (DDT)-1,1,1-trichloro-2,2 - bis(p - chlorophenyl) ethane and some o,p'-isomers; (DDD) or (TDE) - 1,1 - dichloro - 2,2-bis(p-chlorophenyl) ethane and some o,p'-isomers; (DDE) - 1,1 - dichloro-2,2-bis(p-chlorophenyl) ethylene.

(c) Endrin—"Endrin" means the compound endrin as identified by the chemical name 1,2,3,4,10,10-hexachloro-6,7-epoxy - 1,4,4a,5,6,7,8,8a - octahydro - 1,4-endo-5,8-endodimethanonaphthalene.

(d) Toxaphene—"Toxaphene" means a material consisting of technical grade chlorinated camphene having the approximate formula of $C_{10}H_{10}Cl_8$ and normally containing 67-69 percent chlorine by weight.

(e) Benzidine—"Benzidine" means the compound benzidine and its salts as identified by the chemical name 4,4'-diaminobiphenyl.

(f) Polychlorinated Biphenyls (PCBs) "polychlorinated biphenyls" (PCBs) means a mixture of compounds composed of the biphenyl molecule which has been chlorinated to varying degrees.

[42 FR 2613, Jan. 12, 1977, as amended at 42 FR 2620, Jan. 12, 1977; 42 FR 6555, Feb. 2, 1977]

§ 129.5 Compliance.

(a)(1) Within 60 days from the date of promulgation of any toxic pollutant effluent standard or prohibition each owner or operator with a discharge subject to that standard or prohibition must notify the Regional Administrator (or State Director, if appropriate) of such discharge. Such notification shall include such information and follow such procedures as the Regional Administrator (or State Director, if appropriate) may require.

(2) Any owner or operator who does not have a discharge subject to any toxic pollutant effluent standard at the time of such promulgation but who thereafter commences or intends to commence any activity which would result in such a discharge shall first notify the Regional Administrator (or State Director, if appropriate) in the manner herein provided at least 60 days prior to any such discharge.

(b) Upon receipt of any application for issuance or reissuance of a permit or for a modification of an existing permit for a discharge subject to a toxic pollutant effluent standard or prohibition the permitting authority shall proceed thereon in accordance with 40 CFR Part 124 or 125, whichever is applicable.

(c)(1) Every permit which contains limitations based upon a toxic pollutant effluent standard or prohibition under this part is subject to revision following the completion of any proceeding revising such toxic pollutant effluent standard or prohibition regardless of the duration specified on the permit.

(2) For purposes of this section, all toxic pollutants for which standards are set under this part are deemed to be injurious to human health within the meaning of section 402(k) of the Act unless otherwise specified in the standard established for any particular pollutant.

(d)(1) Upon the compliance date for any section 307(a) toxic pollutant effluent standard or prohibition, each owner or operator of a discharge subject to such standard or prohibition shall comply with such monitoring, sampling, recording, and reporting conditions as the Regional Administrator (or State Director, if appropriate) may require for that discharge. Notice of such conditions shall be provided in writing to the owner or operator.

(2) In addition to any conditions required pursuant to paragraph (d)(1) of this section and to the extent not required in conditions contained in NPDES permits, within 60 days following the close of each calendar year each owner or operator of a discharge subject to any toxic standard or prohibition shall report to the Regional Administrator (or State Director, if appropriate) concerning the compliance of such discharges. Such report shall include, as a minimum, information concerning (i) relevant identification of the discharger such as name, location of facility, discharge points, receiving waters, and the industrial process or operation emitting the toxic pollutant; (ii) relevant conditions (pursuant to paragraph (d)(1) of this section or to an NPDES permit) as to flow, section 307(a) toxic pollutant concentrations, and section 307(a) toxic pollutant mass emission rate; (iii) compliance by the discharger with such conditions.

(3) When samples collected for analysis are composited, such samples shall be composited in proportion to the flow at time of collection and preserved in compliance with requirements of the Regional Administrator (or State Director, if appropriate), but shall include at least five samples, collected at approximately equal intervals throughout the working day.

(e)(1) Nothing in these regulations shall preclude a Regional Administrator from requiring in any permit a more stringent effluent limitation or standard pursuant to section 301(b)(1)(C) of the Act and implemented in 40 CFR 125.11 and other related provisions of 40 CFR Part 125.

(2) Nothing in these regulations shall preclude the Director of a State Water Pollution Control Agency or interstate agency operating a National Pollutant Discharge Elimination System Program which has been approved by the Administrator pursuant to section 402 of the Act from requiring in any permit a more stringent effluent limitation or standard pursuant to section 301(b)(1)(C) of the Act and implemented in 40 CFR 124.42 and other related provisions of 40 CFR Part 124.

(f) Any owner or operator of a facility which discharges a toxic pollutant to the navigable waters and to a publicly owned treatment system shall limit the summation of the mass emissions from both discharges to the less restrictive standard, either the direct discharge standard or the pretreatment standard; but in no case will this paragraph allow a discharge to the navigable waters greater than the toxic pollutant effluent standard established for a direct discharge to the navigable waters.

(g) In any permit hearing or other administrative proceeding relating to the implementation or enforcement of these standards, or any modification thereof, or in any judicial proceeding other than a petition for review of these standards pursuant to section 509(b)(1)(C) of the Act, the parties thereto may not contest the validity of any national standards established in this part, or the ambient water criterion established herein for any toxic pollutant.

§ 129.6 Adjustment of effluent standard for presence of toxic pollutant in the intake water.

(a) Upon the request of the owner or operator of a facility discharging a pollutant subject to a toxic pollutant effluent standard or prohibition, the Regional Administrator (or State Director, if appropriate) shall give credit, and shall adjust the effluent standard(s) in such permit to reflect credit for the toxic pollutant(s) in the owner's or operator's water supply if (1) the source of the owner's or operator's water supply is the same body of water into which the discharge is made and if (2) it is demonstrated to the Regional Administrator (or State Director, if appropriate) that the toxic pollutant(s) present in the owner's or operator's intake water will not be removed by any wastewater treatment systems whose design capacity and operation were such as to reduce toxic pollutants to the levels required by the applicable toxic pollutant effluent standards in the absence of the toxic pollutant in the intake water.

(b) Effluent limitations established pursuant to this section shall be calculated on the basis of the amount of section 307(a) toxic pollutant(s) present in the water after any water supply treatment steps have been performed by or for the owner or operator.

(c) Any permit which includes toxic pollutant effluent limitations established pursuant to this section shall also contain conditions requiring the permittee to conduct additional monitoring in the manner and locations determined by the Regional Administrator (or State Director, if appropriate) for those toxic pollutants for which the toxic pollutant effluent standards have been adjusted.

§ 129.7 Requirement and procedure for establishing a more stringent effluent limitation.

(a) *In exceptional cases:* (1) Where the Regional Administrator (or State Director, if appropriate) determines that the ambient water criterion established in these standards is not being met or will not be met in the receiving water as a result of one or more discharges at levels allowed by these standards, and

(2) Where he further determines that this is resulting in or may cause or contribute to significant adverse effects on aquatic or other organisms usually or potentially present, or on human health, he may issue to an owner or operator a permit or a permit modification containing a toxic pollutant effluent limitation at a more stringent level than that required by the standard set forth in these regulations. Any such action shall be taken pursuant to the procedural provisions of 40 CFR Parts 124 and 125, as appropriate. In any proceeding in connection with such action the burden of proof and of going forward with evidence with regard to such more stringent effluent limitation shall be upon the Regional Administrator (or State Director, if appropriate) as the proponent of such more stringent effluent limitation.

(3) Evidence in such proceeding shall include at a minimum: An analysis using data and other information to demonstrate receiving water concentrations of the specified toxic pollutant, projections of the anticipated effects of the proposed modification on such receiving water concentrations, and the hydrologic and hydrographic characteristics of the receiving waters including the occurrence of dispersion of the effluent. Detailed specifications for presenting relevant information by any interested party may be prescribed in guidance documents published from time to time, whose availability will be announced in the FEDERAL REGISTER.

(b) Any effluent limitation in an NPDES permit which a State proposes to issue which is more stringent than the toxic pollutant effluent standards promulgated by the Administrator is subject to review by the Administrator under section 402(d) of the Act. The Administrator may approve or disapprove such limitation(s) or specify another limitation(s) upon review of any record of any proceedings held in connection with the permit issuance or modification and any other evidence available to him. If he takes no action within ninety days of his receipt of the notification of the action of the permit issuing authority and any record thereof, the action of the State permit issuing authority shall be deemed to be approved.

§ 129.8 Compliance date.

(a) The effluent standards or prohibitions set forth herein shall be complied with not later than one year after promulgation unless an earlier date is established by the Administrator for an industrial subcategory in the promulgation of the standards or prohibitions.

(b) Toxic pollutant effluent standards or prohibitions set forth herein shall become enforceable under sections 307(d) and 309 of the Act on the date established in paragraph (a) of this section regardless of proceedings in connection with the issuance of any NPDES permit or application therefor, or modification or renewal thereof.

§§ 129.9—129.99 [Reserved]

§ 129.100 Aldrin/dieldrin.

(a) *Specialized definitions.* (1) "Aldrin/Dieldrin manufacturer" means a manufacturer, excluding any source which is exclusively an aldrin/dieldrin formulator, who produces, prepares or processes technical aldrin or dieldrin or who uses aldrin or dieldrin as a material in the production, preparation or processing of another synthetic organic substance.

(2) "Aldrin/Dieldrin formulator" means a person who produces, prepares or processes a formulated product comprising a mixture of either aldrin or dieldrin and inert materials or other diluents, into a product intended for application in any use registered under the Federal Insecticide, Fungicide and Rodenticide Act, as amended (7 U.S.C. 135, et seq.).

(3) The ambient water criterion for aldrin/dieldrin in navigable waters is 0.003 μg/l.

(b) *Aldrin/dieldrin manufacturer*—(1) *Applicability.* (i) These standards or prohibitions apply to:

(A) All discharges of process wastes; and

(B) All discharges from the manufacturing areas, loading and unloading areas, storage areas and other areas which are subject to direct contamination by aldrin/dieldrin as a result of the manufacturing process, including but not limited to:

(*1*) Stormwater and other runoff except as hereinafter provided in paragraph (b)(1)(ii) of this section; and

(*2*) Water used for routine cleanup or cleanup of spills.

(ii) These standards do not apply to stormwater runoff or other discharges from areas subject to contamination solely by fallout from air emissions of aldrin/dieldrin; or to stormwater runoff that exceeds that from the ten year 24-hour rainfall event.

(2) *Analytical method acceptable.* Environmental Protection Agency method specified in 40 CFR Part 136, except that a 1-liter sample size is required to increase the analytical sensitivity.

(3) *Effluent standard*—(i) *Existing sources.* Aldrin or dieldrin is prohibited in any discharge from any aldrin/dieldrin manufacturer.

(ii) *New Sources.* Aldrin or dieldrin is prohibited in any discharge from any aldrin/dieldrin manufacturer.

(c) *Aldrin/dieldrin formulator*—(1) *Applicability.* (i) These standards or prohibitions apply to:

(A) All discharges of process wastes; and

(B) All discharges from the formulating areas, loading and unloading areas, storage areas and other areas which are subject to direct contamination by aldrin/dieldrin as a result of the formulating process, including but not limited to:

(*1*) Stormwater and other runoff except as hereinafter provided in paragraph (c)(1)(ii) of this section; and

(*2*) Water used for routine cleanup or cleanup of spills.

(ii) These standards do not apply to stormwater runoff or other discharges from areas subject to contamination solely by fallout from air emissions of aldrin/dieldrin; or to stormwater runoff that exceeds that from the ten year 24-hour rainfall event.

(2) *Analytical method acceptable.* Environmental Protection Agency method specified in 40 CFR Part 136, except that a 1-liter sample size is required to increase the analytical sensitivity.

(3) *Effluent standard*—(i) *Existing sources.* Aldrin or dieldrin is prohibited in any discharge from any aldrin/dieldrin formulator.

(ii) *New sources.* Aldrin or dieldrin is prohibited in any discharge from any aldrin/dieldrin formulator.

§ 129.101 DDT, DDD and DDE.

(a) *Specialized definitions.* (1) "DDT Manufacturer" means a manufacturer, excluding any source which is exclusively a DDT formulator, who produces, prepares or processes technical DDT, or who uses DDT as a material in the production, preparation or processing of another synthetic organic substance.

(2) "DDT formulator" means a person who produces, prepares or processes a formulated product comprising a mixture of DDT and inert materials or other diluents into a product intended for application in any use registered under the Federal Insecticide, Fungicide and Rodenticide Act, as amended (7 U.S.C. 135, et seq.).

(3) The ambient water criterion for DDT in navigable waters is 0.001 μg/l.

(b) *DDT manufacturer*—(1) *Applicability.* (i) These standards or prohibitions apply to:

(A) All discharges of process wastes; and

(B) All discharges from the manufacturing areas, loading and unloading areas, storage areas and other areas which are subject to direct contamination by DDT as a result of the manufacturing process, including but not limited to:

(*1*) Stormwater and other runoff except as hereinafter provided in paragraph (b)(1)(ii) of this section; and

(*2*) Water used for routine cleanup or cleanup of spills.

(ii) These standards do not apply to stormwater runoff or other discharges from areas subject to contamination solely by fallout from air emissions of DDT; or to stormwater runoff that exceeds that from the ten year 24-hour rainfall event.

(2) *Analytical method acceptable.* Environmental Protection Agency method specified in 40 CFR Part 136, except that a 1-liter sample size is required to increase the analytical sensitivity.

(3) *Effluent standard*—(i) *Existing sources.* DDT is prohibited in any discharge from any DDT manufacturer.

(ii) *New sources.* DDT is prohibited in any discharge from any DDT manufacturer.

(c) *DDT formulator*—(1) *Applicability.* (i) These standards or prohibitions apply to:

(A) All discharges of process wastes; and

(B) All discharges from the formulating areas, loading and unloading areas, storage areas and other areas which are subject to direct contamination by DDT as a result of the formulating process, including but not limited to:

(*1*) Stormwater and other runoff except as hereinafter provided in paragraph (c)(1)(ii) of this section; and

(*2*) Water used for routine cleanup or cleanup of spills.

(ii) These standards do not apply to stormwater runoff or other discharges from areas subject to contamination solely by fallout from air emissions of DDT; or to stormwater runoff that exceeds that from the ten year 24-hour rainfall event.

(2) *Analytical method acceptable.* Environmental Protection Agency method specified in 40 CFR Part 136, except that a 1-liter sample size is required to increase the analytical sensitivity.

(3) *Effluent standard*—(i) *Existing sources.* DDT is prohibited in any discharge from any DDT formulator.

(ii) *New Sources.* DDT is prohibited in any discharge from any DDT formulator.

§ 129.102 Endrin.

(a) *Specialized definitions.* (1) "Endrin Manufacturer" means a manufacturer, excluding any source which is exclusively an endrin formulator, who produces, prepares or processes technical endrin or who uses endrin as a material in the production, preparation or processing of another synthetic organic substance.

(2) "Endrin Formulator" means a person who produces, prepares or processes a formulated product comprising a mixture of endrin and inert materials or other diluents into a product intended for application in any use registered under the Federal Insecticide, Fungicide and Rodenticide Act, as amended (7 U.S.C. 135, et seq.).

(3) The ambient water criterion for endrin in navigable waters is 0.004 μg/l.

(b) *Endrin manufacturer*—(1) *Applicability.* (i) These standards or prohibitions apply to:

(A) All discharges of process wastes; and

(B) All discharges from the manufacturing areas, loading and unloading areas, storage areas and other areas which are subject to direct contamination by endrin as a result of the manufacturing process, including but not limited to:

(*1*) Stormwater and other runoff except as hereinafter provided in paragraph (b)(1)(ii) of this section; and

(*2*) Water used for routine cleanup or cleanup of spills.

(ii) These standards do not apply to stormwater runoff or other discharges from areas subject to contamination solely by fallout from air emissions of endrin; or to stormwater runoff that exceeds that from the ten year 24-hour rainfall event.

(2) *Analytical method acceptable*—Environmental Protection Agency method specified in 40 CFR Part 136.

(3) *Effluent standard*—(i) *Existing sources.* Discharges from an endrin manufacturer shall not contain endrin concentrations exceeding an average per working day of 1.5 μg/l calculated over any calendar month; and shall not exceed a monthly average daily loading of 0.0006 kg/kkg of endrin produced; and shall not exceed 7.5 μg/l in a sample(s) representing any working day.

(ii) *New sources.* Discharges from an endrin manufacturer shall not contain endrin concentrations exceeding an average per working day of 0.1 μg/l calculated over any calendar month; and shall not exceed a monthly average daily loading of 0.00004 kg/kkg of endrin produced; and shall not exceed 0.5 μg/l in a sample(s) representing any working day.

(iii) *Mass emission standard during shutdown of production.* In computing the allowable monthly average daily loading figure required under the preceding paragraphs (b)(3) (i) and (ii) of this section, for any calendar month for which there is no endrin being manufactured at any plant or facility which normally contributes to the discharge which is subject to these standards, the applicable production value shall be deemed to be the average monthly production level for the most recent preceding 360 days of actual operation of the plant or facility.

(c) *Endrin formulator*—(1) *Applicability.* (i) These standards or prohibitions apply to:

(A) All discharges of process wastes; and

(B) All discharges from the formulating areas, loading and unloading areas, storage areas and other areas which are subject to direct contamination by endrin as a result of the formulating process, including but not limited to: (*1*) Stormwater and other runoff except as hereinafter provided in paragraph (c)(1)(ii) of this section; and (*2*) water used for routine cleanup or cleanup of spills.

(ii) These standards do not apply to stormwater runoff or other discharges from areas subject to contamination solely by fallout from air emissions of endrin; or to storm-water runoff that exceeds that from the ten year 24-hour rainfall event.

(2) *Analytical method acceptable*—Environmental Protection Agency method specified in 40 CFR Part 136, except that a 1-liter sample size is required to increase the analytical sensitivity.

(3) *Effluent standard*—(i) *Existing sources.* Endrin is prohibited in any discharge from any endrin formulator.

(ii) New sources—Endrin is prohibited in any discharge from any endrin formulator.

(d) The standards set forth in this section shall apply to the total combined weight or concentration of endrin, excluding any associated element or compound.

§ 129.103 Toxaphene.

(a) *Specialized definitions.* (1) "Toxaphene manufacturer" means a manufacturer, excluding any source which is exclusively a toxaphene formulator, who produces, prepares or processes toxaphene or who uses toxaphene as a material in the production, preparation or processing of another synthetic organic substance.

(2) "Toxaphene formulator" means a person who produces, prepares or processes a formulated product comprising a mixture of toxaphene and inert materials or other diluents into a product intended for application in any use registered under the Federal Insecticide, Fungicide and Rodenticide Act, as amended (7 U.S.C. 135, *et seq.*).

(3) The ambient water criterion for toxaphene in navigable waters is 0.005 μg/l.

(b) *Toxaphene manufacturer*—(1) *Applicability.* (i) These standards or prohibitions apply to:

(A) All discharges of process wastes; and

(B) All discharges from the manufacturing areas, loading and unloading areas, storage areas and other areas which are subject to direct contamination by toxaphene as a result of the manufacturing process, including but not limited to: (*1*) Stormwater and other runoff except as hereinafter provided in paragraph (b)(1)(ii) of this section; and (*2*) water used for routine cleanup or cleanup of spills.

(ii) These standards do not apply to stormwater runoff or other discharges from areas subject to contamination solely by fallout from air emissions of toxaphene; or to stormwater runoff that exceeds that from the ten year 24-hour rainfall event.

(2) *Analytical method acceptable*—Environmental Protection Agency method specified in 40 CFR Part 136.

(3) *Effluent standard*—(i) *Existing sources.* Discharges from a toxaphene manufacturer shall not contain toxaphene concentrations exceeding an average per working day of 1.5 μg/l calculated over any calendar month; and shall not exceed a monthly average daily loading of 0.00003 kg/kkg of toxaphene produced, and shall not exceed 7.5 μg/l in a sample(s) representing any working day.

(ii) *New sources.* Discharges from a toxaphene manufacturer shall not contain toxaphene concentrations exceeding an average per working day of 0.1 μg/l calculated over any calendar month; and shall not exceed a monthly average daily loading of 0.000002 kg/kkg of toxaphene produced, and shall not exceed 0.5 μ/l in a sample(s) representing any working day.

(iii) *Mass emission during shutdown of production.* In computing the allowable monthly average daily loading figure required under the preceding paragraphs (b)(3)(i) and (ii) of this section, for any calendar month for which there is no toxaphene being manufactured at any plant or facility which normally contributes to the discharge which is subject to these standards, the applicable production value shall be deemed to be the average monthly production level for the most recent preceding 360 days of actual operation of the plant or facility.

(c) *Toxaphene formulator*—(1) *Applicability.* (i) These standards or prohibitions apply to:

(A) All discharges of process wastes; and

(B) All discharges from the formulating areas, loading and unloading areas, storage areas and other areas which are subject to direct contamination by toxaphene as a result of the formulating process, including but not limited to: (*1*) Stormwater and other runoff except as hereinafter provided in paragraph (c)(1)(ii) of this section; and (*2*) water used for routine cleanup or cleanup of spills.

(ii) These standards do not apply to stormwater runoff or other discharges from areas subject to contamination solely by fallout from air emissions of toxaphene; or to stormwater runoff that exceeds that from the ten year 24-hour rainfall event.

(2) *Analytical method acceptable*—Environmental Protection Agency method specified in 40 CFR Part 136, except that a 1-liter sample size is required to increase the analytical sensitivity.

(3) *Effluent standards*—(i) *Existing sources.* Toxaphene is prohibited in any discharge from any toxaphene formulator.

(ii) *New sources.* Toxaphene is prohibited in any discharge from any toxaphene formulator.

(d) The standards set forth in this section shall apply to the total combined weight or concentration of toxaphene, excluding any associated element or compound.

§ 129.104 Benzidine.

(a) *Specialized definitions.* (1) "Benzidine Manufacturer" means a manufacturer who produces benzidine or who produces benzidine as an intermediate product in the manufacture of dyes commonly used for textile, leather and paper dyeing.

(2) "Benzidine-Based Dye Applicator" means an owner or operator who uses benzidine-based dyes in the dyeing of textiles, leather or paper.

(3) The ambient water criterion for benzidine in navigable waters is 0.1 μg/l.

(b) *Benzidine manufacturer*—(1) *Applicability.* (i) These standards apply to:

(A) All discharges into the navigable waters of process wastes, and

(B) All discharges into the navigable waters of wastes containing benzidine from the manufacturing areas, loading and unloading areas, storage areas, and other areas subject to direct contamination by benzidine or benzidine-containing product as a result of the manufacturing process, including but not limited to:

(*1*) Stormwater and other runoff except as hereinafter provided in paragraph (b)(1)(ii) of this section, and

(*2*) Water used for routine cleanup or cleanup of spills.

(ii) These standards do not apply to stormwater runoff or other discharges from areas subject to contamination solely by fallout from air emissions of benzidine; or to stormwater runoff that exceeds that from the ten year 24-hour rainfall event.

(2) *Analytical method acceptable*—Environmental Protection Agency method specified in 40 CFR Part 136.

(3) *Effluent standards*—(i) *Existing sources.* Discharges from a benzidine manufacturer shall not contain benzidine concentrations exceeding an average per working day of 10 μg/l calculated over any calendar month, and shall not exceed a monthly average daily loading of 0.130 kg/kkg of benzidine produced, and shall not exceed 50 μg/l in a sample(s) representing any working day.

(ii) *New sources.* Discharges from a benzidine manufacturer shall not contain benzidine concentrations exceeding an average per working day of 10 μg/l calculated over any calendar month, and shall not exceed a monthly average daily loading of 0.130 kg/kkg of benzidine produced, and shall not exceed 50 μg/l in a sample(s) representing any working day.

(4) The standards set forth in this paragraph (b) shall apply to the total combined weight or concentration of benzidine, excluding any associated element or compound.

(c) *Benzidine-based dye applicators*—(1) *Applicability.* (i) These standards apply to:

(A) All discharges into the navigable waters of process wastes, and

(B) All discharges into the navigable waters of wastes containing benzidine from the manufacturing areas, loading and unloading areas, storage areas, and other areas subject to direct contamination by benzidine or benzidine-containing product as a result of the manufacturing process, including but not limited to:

(*1*) Stormwater and other runoff except as hereinafter provided in paragraph (c)(1)(ii) of this section, and

(*2*) Water used for routine cleanup or cleanup of spills.

(ii) These standards do not apply to stormwater runoff or other discharges from areas subject to contamination solely by fallout from air emissions of benzidine; or to stormwater that exceeds that from the ten year 24-hour rainfall event.

(2) *Analytical method acceptable.* (i) Environmental Protection Agency method specified in 40 CFR Part 136; or

(ii) Mass balance monitoring approach which requires the calculation of the benzidine concentration by dividing the total benzidine contained in dyes used during a working day (as certified in writing by the manufacturer) by the total quantity of water discharged during the working day.

[*Comment*: The Regional Administrator (or State Director, if appropriate) shall rely entirely upon the method specified in 40 CFR Part 136 in analyses performed by him for enforcement purposes.]

(3) *Effluent standards*—(i) *Existing sources.* Discharges from benzidine-based dye applicators shall not contain benzidine concentrations exceeding an average per working day of 10 μg/l calculated over any calendar month; and shall not exceed 25 μg/l in a sample(s) or calculation(s) representing any working day.

(ii) *New sources.* Discharges from benzidine-based dye applicators shall not contain benzidine concentrations exceeding an average per working day of 10 μg/l calculated over any calendar month; and shall not exceed 25 μg/l in a sample(s) or calculation(s) representing any working day.

(4) The standards set forth in this paragraph (c) shall apply to the total combined concentrations of benzidine, excluding any associated element or compound.

[42 FR 2620, Jan. 12, 1977]

§ 129.105 Polychlorinated biphenyls (PCBs).

(a) *Specialized definitions.* (1) "PCB Manufacturer" means a manufacturer who produces polychlorinated biphenyls.

(2) "Electrical capacitor manufacturer" means a manufacturer who produces or assembles electrical capacitors in which PCB or PCB-containing compounds are part of the dielectric.

(3) "Electrical transformer manufacturer" means a manufacturer who produces or assembles electrical transformers in which PCB or PCB-containing compounds are part of the dielectric.

(4) The ambient water criterion for PCBs in navigable waters is 0.001 μg/l.

(b) *PCB manufacturer*—(1) *Applicability.* (i) These standards or prohibitions apply to:

(A) All discharges of process wastes;

(B) All discharges from the manufacturing or incinerator areas, loading and unloading areas, storage areas, and other areas which are subject to direct contamination by PCBs as a result of the manufacturing process, including but not limited to:

(*1*) Stormwater and other runoff except as hereinafter provided in paragraph (b)(1)(ii) of this section; and

(*2*) Water used for routine cleanup or cleanup of spills.

(ii) These standards do not apply to stormwater runoff or other discharges from areas subject to contamination solely by fallout from air emissions of PCBs; or to stormwater runoff that exceeds that from the ten-year 24-hour rainfall event.

(2) Analytical Method Acceptable—Environmental Protection Agency method specified in 40 CFR Part 136 except that a 1-liter sample size is required to increase analytical sensitivity.

(3) *Effluent standards*—(i) *Existing sources.* PCBs are prohibited in any discharge from any PCB manufacturer;

(ii) *New sources.* PCBs are prohibited in any discharge from any PCB manufacturer.

(c) *Electrical capacitor manufacturer*—(1) *Applicability.* (i) These standards or prohibitions apply to:

(A) All discharges of process wastes; and

(B) All discharges from the manufacturing or incineration areas, loading and unloading areas, storage areas and other areas which are subject to direct contamination by PCBs as a result of the manufacturing process, including but not limited to:

(*1*) Stormwater and other runoff except as hereinafter provided in paragraph (c)(1)(ii) of this section; and

(*2*) Water used for routine cleanup or cleanup of spills.

(ii) These standards do not apply to stormwater runoff or other discharges from areas subject to contamination solely by fallout from air emissions of PCBs; or to stormwater runoff that exceeds that from the ten-year 24-hour rainfall event.

(2) *Analytical method acceptable.* Environmental Protection Agency method specified in 40 CFR Part 136, except that a 1-liter sample size is required to increase analytical sensitivity.

(3) *Effluent standards*—(i) *Existing sources.* PCBs are prohibited in any discharge from any electrical capacitor manufacturer;

(ii) *New sources.* PCBs are prohibited in any discharge from any electrical capacitor manufacturer.

(d) *Electrical transformer manufacturer*—(1) *Applicability.* (i) These standards or prohibitions apply to:

(A) All discharges of process wastes; and

(B) All discharges from the manufacturing or incineration areas, loading and unloading areas, storage areas, and other areas which are subject to direct contamination by PCBs as a result of the manufacturing process, including but not limited to:

(*1*) Stormwater and other runoff except as hereinafter provided in paragraph (d)(1)(ii) of this section; and

(*2*) Water used for routine cleanup or cleanup of spills.

(ii) These standards do not apply to stormwater runoff or other discharges from areas subject to contamination solely by fallout from air emissions of PCBs; or to stormwater runoff that exceeds that from the ten-year 24-hour rainfall event.

(2) *Analytical method acceptable.* Environmental Protection Agency method specified in 40 CFR Part 136, except that a 1-liter sample size is required to increase analytical sensitivity.

(3) *Effluent standards*—(i) *Existing sources.* PCBs are prohibited in any discharge from any electrical transformer manufacturer;

(ii) *New sources.* PCBs are prohibited in any discharge from any electrical transformer manufacturer.

(e) *Adjustment of effluent standard for presence of PCBs in intake water.* Whenever a facility which is subject to these standards has PCBs in its effluent which result from the presence of PCBs in its intake waters, the owner may apply to the Regional Administrator (or State Director, if appropriate), for a credit pursuant to the provisions of § 129.6, where the source of the water supply is the same body of water into which the discharge is made. The requirement of paragraph (1) of § 129.6(a), relating to the source of the water supply, shall be waived, and such facility shall be eligible to apply for a credit under § 129.6, upon a showing by the owner or operator of such facility to the Regional Administrator (or State Director, if appropriate) that the concentration of PCBs in the intake water supply of such facility does not exceed the concentration of PCBs in the receiving water body to which the plant discharges its effluent.

[42 FR 6555, Feb. 2, 1977]

PART 130—WATER QUALITY PLANNING AND MANAGEMENT

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AUTHORITY: 33 U.S.C. 1251 *et seq.*

SOURCE: 50 FR 1779, Jan. 11, 1985, unless otherwise noted.

§ 130.0 Program summary and purpose.

(a) This subpart establishes policies and program requirements for water quality planning, management and implementation under sections 106, 205(j), non-construction management 205(g), 208, 303 and 305 of the Clean Water Act. The Water Quality Management (WQM) process described in the Act and in this regulation provides the authority for a consistent national approach for maintaining, improving and protecting water quality while allowing States to implement the most effective individual programs. The process is implemented jointly by EPA, the States, interstate agencies, and areawide, local and regional planning organizations. This regulation explains the requirements of the Act, describes the relationships between the several components of the WQM process and outlines the roles of the major participants in the process. The components of the WQM process are discussed below.

(b) Water quality standards (WQS) are the State's goals for individual water bodies and provide the legal basis for control decisions under the Act. Water quality monitoring activities provide the chemical, physical and biological data needed to determine the present quality of a State's waters and to identify the sources of pollutants in those waters. The primary assessment of the quality of a State's water is contained in its biennial Report to Congress required by section 305(b) of the Act.

(c) This report and other assessments of water quality are used in the State's WQM plans to identify priority water quality problems. These plans also contain the results of the State's analyses and management decisions which are necessary to control specific sources of pollution. The plans recommend control measures and designated management agencies (DMAs) to attain the goals established in the State's water quality standards.

(d) These control measures are implemented by issuing permits, building publicly-owned treatment works (POTWs), instituting best management practices for nonpoint sources of pollution and other means. After control measures are in place, the State evaluates the extent of the resulting improvements in water quality, conducts additional data gathering and planning to determine needed modifications in control measures and again institutes control measures.

(e) This process is a dynamic one, in which requirements and emphases vary over time. At present, States have completed WQM plans which are generally comprehensive in geographic and programmatic scope. Technology based controls are being implemented for most point sources of pollution. However, WQS have not been attained in many water bodies and are threatened in others.

(f) Present continuing planning requirements serve to identify these critical water bodies, develop plans for achieving higher levels of abatement and specify additional control measures. Consequently, this regulation reflects a programmatic emphasis on concentrating planning and abatement activities on priority water quality issues and geographic areas. EPA will focus its grant funds on activities designed to address these priorities. Annual work programs negotiated between EPA and State and interstate agencies will reflect this emphasis.

§ 130.1 Applicability.

(a) This subpart applies to all State, Indian Tribe treated as a State, interstate, areawide and regional and local CWA water quality planning and management activities undertaken on or after February 11, 1985 including all updates and continuing certifications for approved Water Quality Management (WQM) plans developed under sections 208 and 303 of the Act.

(b) Planning and management activities undertaken prior to February 11, 1985 are governed by the requirements of the regulations in effect at the time of the last grant award.

[50 FR 1779, Jan. 11, 1985, as amended at 54 FR 14359, Apr. 11, 1989]

§ 130.2 Definitions.

(a) *The Act.* The Clean Water Act, as amended, 33 U.S.C. 1251 *et seq.*

(b) *Indian Tribe.* Any Indian Tribe, band, group, or community recognized by the Secretary of the Interior and exercising governmental authority over a Federal Indian reservation.

(c) *Pollution.* The man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water.

(d) *Water quality standards (WQS).* Provisions of State or Federal law which consist of a designated use or uses for the waters of the United States and water quality criteria for such waters based upon such uses. Water quality standards are to protect the public health or welfare, enhance the quality of water and serve the purposes of the Act.

(e) *Load or loading.* An amount of matter or thermal energy that is introduced into a receiving water; to introduce matter or thermal energy into a receiving water. Loading may be either man-caused (pollutant loading) or natural (natural background loading).

(f) *Loading capacity.* The greatest amount of loading that a water can receive without violating water quality standards.

(g) *Load allocation (LA).* The portion of a receiving water's loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources. Load allocations are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. Wherever possible, natural and nonpoint source loads should be distinguished.

(h) *Wasteload allocation* (*WLA*). The portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. WLAs constitute a type of water quality-based effluent limitation.

(i) *Total maximum daily load* (*TMDL*). The sum of the individual WLAs for point sources and LAs for nonpoint sources and natural background. If a receiving water has only one point source discharger, the TMDL is the sum of that point source WLA plus the LAs for any nonpoint sources of pollution and natural background sources, tributaries, or adjacent segments. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure. If Best Management Practices (BMPs) or other nonpoint source pollution controls make more stringent load allocations practicable, then wasteload allocations can be made less stringent. Thus, the TMDL process provides for nonpoint source control tradeoffs.

(j) *Water quality limited segment.* Any segment where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards, even after the application of the technology-based effluent limitations required by sections 301(b) and 306 of the Act.

(k) *Water quality management* (*WQM*) *plan.* A State or areawide waste treatment management plan developed and updated in accordance with the provisions of sections 205(j), 208 and 303 of the Act and this regulation.

(l) *Areawide agency.* An agency designated under section 208 of the Act, which has responsibilities for WQM planning within a specified area of a State.

(m) *Best Management Practice* (*BMP*). Methods, measures or practices selected by an agency to meet its nonpoint source control needs. BMPs include but are not limited to structural and nonstructural controls and operation and maintenance procedures. BMPs can be applied before, during and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters.

(n) *Designated management agency* (*DMA*). An agency identified by a WQM plan and designated by the Governor to implement specific control recommendations.

[50 FR 1779, Jan. 11, 1985, as amended at 54 FR 14359, Apr. 11, 1989]

§ 130.3 Water quality standards.

A water quality standard (WQS) defines the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses. States and EPA adopt WQS to protect public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act (CWA). "Serve the purposes of Act" (as defined in sections 101(a)(2) and 303(c) of the Act) means that WQS should, wherever attainable, provide water quality for the protection and propagation of fish, shellfish and wildlife and for recreation in and on the water and take into consideration their use and value for public water supplies, propagation of fish, shellfish, wildlife, recreation in and on the water, and agricultural, industrial and other purposes including navigation.

Such standards serve the dual purposes of establishing the water quality goals for a specific water body and serving as the regulatory basis for establishment of water quality-based treatment controls and strategies beyond the technology-based level of treatment required by sections 301(b) and 306 of the Act. States shall review and revise WQS in accordance with applicable regulations and, as appropriate, update their Water Quality Management (WQM) plans to reflect such revisions. Specific WQS requirements are found in 40 CFR Part 131.

§ 130.4 Water quality monitoring.

(a) In accordance with section 106(e)(1), States must establish appropriate monitoring methods and procedures (including biological monitoring) necessary to compile and analyze data on the quality of waters of the United States and, to the extent practicable ground-waters. This requirement need not be met by Indian Tribes. However, any monitoring and/or analysis activities undertaken by a Tribe must be performed in accordance with EPA's quality assurance/quality control guidance.

(b) The State's water monitoring program shall include collection and analysis of physical, chemical and biological data and quality assurance and control programs to assure scientifically valid data. The uses of these data include determining abatement and control priorities; developing and reviewing water quality standards, total maximum daily loads, wasteload allocations and load allocations; assessing compliance with National Pollutant Discharge Elimination System (NPDES) permits by dischargers; reporting information to the public through the section 305(b) report and reviewing site-specific monitoring efforts.

[50 FR 1779, Jan. 11, 1985, as amended at 54 FR 14359, Apr. 11, 1989]

§ 130.5 Continuing planning process.

(a) *General.* Each State shall establish and maintain a continuing planning process (CPP) as described under section 303(e)(3)(A)—(H) of the Act. Each State is responsible for managing its water quality program to implement the processes specified in the continuing planning process. EPA is esponsible for periodically reviewing he adequacy of the State's CPP.

(b) *Content.* The State may determine the format of its CPP as long as he mininum requirements of the CWA and this regulation are met. The ollowing processes must be described n each State CPP, and the State may nclude other processes at its discretion.

(1) The process for developing effluent limitations and schedules of compliance at least as stringent as those equired by sections 301(b) (1) and (2), 06 and 307, and at least stringent as ny requirements contained in applicale water quality standards in effect nder authority of section 303 of the ct.

(2) The process for incorporating lements of any applicable areawide aste treatment plans under section 208, and applicable basin plans under section 209 of the Act.

(3) The process for developing total maximum daily loads (TMDLs) and individual water quality based effluent limitations for pollutants in accordance with section 303(d) of the Act and § 130.7(a) of this regulation.

(4) The process for updating and maintaining Water Quality Management (WQM) plans, including schedules for revision.

(5) The process for assuring adequate authority for intergovernmental cooperation in the implementation of the State WQM program.

(6) The process for establishing and assuring adequate implementation of new or revised water quality standards, including schedules of compliance, under section 303(c) of the Act.

(7) The process for assuring adequate controls over the disposition of all residual waste from any water treatment processing.

(8) The process for developing an inventory and ranking, in order of priority of needs for construction of waste treatment works required to meet the applicable requirements of sections 301 and 302 of the Act.

(9) The process for determining the priority of permit issuance.

(c) *Regional Administrator review.* The Regional Administrator shall review approved State CPPs from time to time to ensure that the planning processes are consistent with the Act and this regulation. The Regional Administrator shall not approve any permit program under Title IV of the Act for any State which does not have an approved continuing planning process.

§ 130.6 Water quality management plans.

(a) *Water quality management (WQM) plans.* WQM plans consist of initial plans produced in accordance with sections 208 and 303(e) of the Act and certified and approved updates to those plans. Continuing water quality planning shall be based upon WQM plans and water quality problems identified in the latest 305(b) reports. State water quality planning should focus annually on priority issues and geographic areas and on the development of water quality controls leading to implementation measures. Water quality planning directed at the removal of conditions placed on previously certified and approved WQM plans should focus on removal of conditions which will lead to control decisions.

(b) *Use of WQM plans.* WQM plans are used to direct implementation. WQM plans draw upon the water quality assessments to identify priority point and nonpoint water quality problems, consider alternative solutions and recommend control measures, including the financial and institutional measures necessary for implementing recommended solutions. State annual work programs shall be based upon the priority issues identified in the State WQM plan.

(c) *WQM plan elements.* Sections 205(j), 208 and 303 of the Act specify water quality planning requirements. The following plan elements shall be included in the WQM plan or referenced as part of the WQM plan if contained in separate documents when they are needed to address water quality problems.

(1) *Total maximum daily loads.* TMDLs in accordance with sections 303(d) and (e)(3)(C) of the Act and § 130.7 of this part.

(2) *Effluent limitations.* Effluent limitations including water quality based effluent limitations and schedules of compliance in accordance with section 303(e)(3)(A) of the Act and § 130.5 of this part.

(3) *Municipal and industrial waste treatment.* Identification of anticipated municipal and industrial waste treatment works, including facilities for treatment of stormwater-induced combined sewer overflows; programs to provide necessary financial arrangements for such works; establishment of construction priorities and schedules for initiation and completion of such treatment works including an identification of open space and recreation opportunities from improved water quality in accordance with section 208(b)(2) (A) and (B) of the Act.

(4) *Nonpoint source management and control.* (i) The plan shall describe the regulatory and non-regulatory programs, activities and Best Management Practices (BMPs) which the agency has selected as the means to control nonpoint source pollution where necessary to protect or achieve approved water uses. Economic, institutional, and technical factors shall be considered in a continuing process of identifying control needs and evaluating and modifying the BMPs as necessary to achieve water quality goals.

(ii) Regulatory programs shall be identified where they are determined to be necessary by the State to attain or maintain an approved water use or where non-regulatory approaches are inappropriate in accomplishing that objective.

(iii) BMPs shall be identified for the nonpoint sources identified in section 208(b)(2)(F)-(K) of the Act and other nonpoint sources as follows:

(A) *Residual waste.* Identification of a process to control the disposition of all residual waste in the area which could affect water quality in accordance with section 208(b)(2)(J) of the Act.

(B) *Land disposal.* Identification of a process to control the disposal of pollutants on land or in subsurface excavations to protect ground and surface water quality in accordance with section 208(b)(2)(K) of the Act.

(C) *Agricultural and silvicultural.* Identification of procedures to control agricultural and silvicultural sources of pollution in accordance with section 208(b)(2)(F) of the Act.

(D) *Mines.* Identification of procedures to control mine-related sources of pollution in accordance with section 208(b)(2)(G) of the Act.

(E) *Construction.* Identification of procedures to control construction related sources of pollution in accordance with section 208(b)(2)(H) of the Act.

(F) *Saltwater intrusion.* Identification of procedures to control saltwater intrusion in accordance with section 208(b)(2)(I) of the Act.

(G) *Urban stormwater.* Identification of BMPs for urban stormwater control to achieve water quality goals and fiscal analysis of the necessary capital and operations and maintenance expenditures in accordance with section 208(b)(2)(A) of the Act.

(iv) The nonpoint source plan elements outlined in § 130.6(c)(4)(iii)(A)(G) of this regulation shall be the basis of water quality activities implemented through agreements or memoranda of understanding between EPA and other departments, agencies or instrumentalities of the United States in accordance with section 304(k) of the Act.

(5) *Management agencies.* Identification of agencies necessary to carry out the plan and provision for adequate authority for intergovernmental cooperation in accordance with sections 208(b)(2)(D) and 303(e)(3)(E) of the Act. Management agencies must demonstrate the legal, institutional, managerial and financial capability and specific activities necessary to carry out their responsibilities in accordance with section 208(c)(2)(A) through (I) of the Act.

(6) *Implementation measures.* Identification of implementation measures necessary to carry out the plan, including financing, the time needed to carry out the plan, and the economic, social and environmental impact of carrying out the plan in accordance with section 208(b)(2)(E).

(7) *Dredge or fill program.* Identification and development of programs for the control of dredge or fill material in accordance with section 208(b)(4)(B) of the Act.

(8) *Basin plans.* Identification of any relationship to applicable basin plans developed under section 209 of the Act.

(9) *Ground water.* Identification and development of programs for control of ground-water pollution including he provisions of section 208(b)(2)(K) f the Act. States are not required to develop ground-water WQM plan elements beyond the requirements of section 208(b)(2)(K) of the Act, but may develop a ground-water plan element f they determine it is necessary to address a ground-water quality problem. f a State chooses to develop a ground-water plan element, it should describe he essentials of a State program and hould include, but is not limited to:

(i) Overall goals, policies and legislative authorities for protection of round-water.

(ii) Monitoring and resource assessment programs in accordance with section 106(e)(1) of the Act.

(iii) Programs to control sources of contamination of ground-water including Federal programs delegated to the State and additional programs authorized in State statutes.

(iv) Procedures for coordination of ground-water protection programs among State agencies and with local and Federal agencies.

(v) Procedures for program management and administration including provision of program financing, training and technical assistance, public participation, and emergency management.

(d) *Indian Tribes.* An Indian Tribe may be treated as a State for the purposes of this rule and the Clean Water Act assistance programs under 40 CFR Part 35, Subparts A and H if:

(1) The Indian Tribe has a governing body carrying out substantial governmental duties and powers;

(2) The functions to be exercised by the Indian Tribe pertain to the management and protection of water resources which are held by an Indian Tribe, held by the United States in trust for Indians, held by a member of an Indian Tribe if such property interest is subject to a trust restriction on alienation, or otherwise within the borders of an Indian reservation; and

(3) The Indian Tribe is reasonably expected to be capable, in the Regional Administrator's judgment, of carrying out the functions to be exercised in a manner consistent with the terms and purposes of the Clean Water Act and applicable regulations.

(e) *Update and certification.* State and/or areawide agency WQM plans shall be updated as needed to reflect changing water quality conditions, results of implementation actions, new requirements or to remove conditions in prior conditional or partial plan approvals. Regional Administrators may require that State WQM plans be updated as needed. State Continuing Planning Processes (CPPs) shall specify the process and schedule used to revise WQM plans. The State shall ensure that State and areawide WQM plans together include all necessary plan elements and that such plans are consistent with one another. The Governor or the Governor's designee shall certify by letter to the Regional Administrator for EPA approval that WQM plan updates are consistent with all other parts of the plan. The certification may be contained in the annual State work program.

(f) *Consistency.* Construction grant and permit decisions must be made in accordance with certified and approved WQM plans as described in §§ 130.12(a) and 130.12(b).

[50 FR 1779, Jan. 11, 1985, as amended at 54 FR 14360, Apr. 11, 1989]

§ 130.7 Total maximum daily loads (TMDL) and individual water quality-based effluent limitations.

(a) *General.* The process for identifying water quality limited segments still requiring wasteload allocations, load allocations and total maximum daily loads (WLAs/LAs and TMDLs), setting priorities for developing these loads; establishing these loads for segments identified, including water quality monitoring, modeling, data analysis, calculation methods, and list of pollutants to be regulated; submitting the State's list of segments identified, priority ranking, and loads established (WLAs/LAs/TMDLs) to EPA for approval; incorporating the approved loads into the State's WQM plans and NPDES permits; and involving the public, affected dischargers, designated areawide agencies, and local governments in this process shall be clearly described in the State Continuing Planning Process (CPP).

(b) Identification and priority setting for water quality limited segments still requiring WLAs/LAs and TMDLs.

(1) Each State shall identify those water quality limited segments still requiring WLAs/LAs and TMDLs within its boundaries for which:

(i) Technology-based effluent limitations required by sections 301(b), 306, 307, or other sections of the Act;

(ii) More stringent effluent limitations (including prohibitions) required by either State or local authority preserved by section 510 of the Act, or Federal authority (e.g., law, regulation, or treaty); and

(iii) Other pollution control requirements (e.g., best management practices) required by local, State, or Federal authority are not stringent enough to implement any water quality standard (WQS) applicable to such waters. The State shall, establish a priority ranking for such water quality limited segments still requiring WLAs/LAs and TMDLs, taking into account the severity of the pollution and the uses to be made of such waters and shall identify the pollutants causing or expected to cause violations of the water quality standards.

(2) Each State shall identify those water quality limited segments still requiring WLAs/LAs and TMDLs or parts thereof within its boundaries for which controls on thermal discharges under section 301 or State or local requirements are not stringent enough to assure protection and propagation of a balanced indigenous population of shellfish, fish and wildlife.

(c) Development of TMDLs and individual water quality based effluent limitations.

(1) Each State shall establish WLAs/LAs and TMDLs for the water quality limited segments identified in paragraph (b)(1) of this section, and in accordance with the priority ranking. For pollutants other than heat, WLAs/LAs and TMDLs shall be established at levels necessary to attain and maintain the applicable narrative and numerical WQS with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality. Determinations of WLAs/LAs and TMDLs shall take into account critical conditions for stream flow, loading, and water quality parameters.

(i) TMDLs may be established using a pollutant-by-pollutant or biomonitoring approach. In many cases both techniques may be needed. Site-specific information should be used wherever possible.

(ii) TMDLs shall be established for all pollutants preventing or expected to prevent attainment of water quality standards as identified pursuant to paragraph (b)(1) of this section. Calculations to establish WLAs/LAs and

TMDLs shall be subject to public review as defined in the State CPP.

(2) Each State shall estimate for the water quality limited segments still requiring WLAs/LAs and TMDLs identified in paragraph (b)(2) of this section, the total maximum daily thermal load which cannot be exceeded in order to assure protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife. Such estimates shall take into account the normal water temperatures, flow rates, seasonal variations, existing sources of heat input, and the dissipative capacity of the identified waters or parts thereof. Such estimates shall include a calculation of the maximum heat input that can be made into each such part and shall include a margin of safety which takes into account any lack of knowledge concerning the development of thermal water quality criteria for protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife in the identified waters or parts thereof.

(d) *Submission and EPA approval.* (1) Each State shall submit to the Regional Administrator from time to time for approval the listing of water quality limited segments requiring WLAs/LAs and TMDLs identified under paragraph (b) of this section. All WLAs/LAs and TMDLs established under paragraph (c) for water quality limited segments shall continue to be submitted to EPA for review and approval. Schedules for submission of WLAs/LAs and TMDLs shall be determined by the Regional Administrator and the State.

The Regional Administrator shall either approve or disapprove such listing and loadings not later than 30 days after the date of submission. If the Regional Administrator approves such listing and loadings, the State shall incorporate them into its current WQM plan. If the Regional Administrator disapproves such listing and loadings, he shall, not later than 30 days after the date of such disapproval, identify such waters in such State and establish such loads for such waters as determined necessary to implement applicable WQS. The Regional Administrator shall promptly issue a public notice seeking comment on such listing and loadings. After considering public comment and making any revisions he deems appropriate, the Regional Administrator shall transmit the listing and loads to the State, which shall incorporate them into its current WQM plan.

(e) For the specific purpose of developing information and as resources allow, each State shall identify all segments within its boundaries which it has not identified under paragraph (b) of this section and estimate for such waters the TMDLs with seasonal variations and margins of safety, for those pollutants which the Regional Administrator identifies under section 304(a)(2) as suitable for such calculation and for thermal discharges, at a level that would assure protection and propagation of a balanced indigenous population of fish, shellfish and wildlife. However, there is no requirement for such loads to be submitted to EPA for approval, and establishing WLAs/LAs and TMDLs for those waters identified in paragraph (b) of this section shall be given higher priority.

§ 130.8 Water quality report.

(a) Each State shall prepare and submit biennially to the Regional Administrator a water quality report in accordance with section 305(b) of the Act. The water quality report serves as the primary assessment of State water quality. Based upon the water quality data and problems identified in the 305(b) report, States develop water quality management (WQM) plan elements to help direct all subsequent control activities. Water quality problems identified in the 305(b) report should be analyzed through water quality management planning leading to the development of alternative controls and procedures for problems identified in the latest 305(b) report. States may also use the 305(b) report to describe ground-water quality and to guide development of ground-water plans and programs. Water quality problems identified in the 305(b) report should be emphasized and reflected in the State's WQM plan and annual work program under sections 106 and 205(j) of the Clean Water Act.

(b) Each such report shall include but is not limited to the following:

(1) A description of the water quality of all waters of the United States and the extent to which the quality of waters provides for the protection and propagation of a balanced population of shellfish, fish, and wildlife and allows recreational activities in and on the water.

(2) An estimate of the extent to which CWA control programs have improved water quality or will improve water quality for the purposes of paragraph (b)(1) of this section, and recommendations for future actions necessary and identifications of waters needing action.

(3) An estimate of the environmental, economic and social costs and benefits needed to achieve the objectives of the CWA and an estimate of the date of such achievement.

(4) A description of the nature and extent of nonpoint source pollution and recommendations of programs needed to control each category of nonpoint sources, including an estimate of implementation costs.

(c) States may include a description of the nature and extent of ground-water pollution and recommendations of State plans or programs needed to maintain or improve ground-water quality.

(d) In the years in which it is prepared the biennial section 305(b) report satisfies the requirement for the annual water quality report under section 205(j). In years when the 305(b) report is not required, the State may satisfy the annual section 205(j) report requirement by certifying that the most recently submitted section 305(b) report is current or by supplying an update of the sections of the most recently submitted section 305(b) report which require updating.

§ 130.9 Designation and de-designation.

(a) *Designation.* Areawide planning agencies may be designated by the Governor in accordance with section 208(a) (2) and (3) of the Act or may self-designate in accordance with section 208(a)(4) of the Act. Such designations shall subject to EPA approval in accordance with section 208(a)(7) of the Act.

(b) *De-designation.* The Governor may modify or withdraw the planning designation of a designated planning agency other than an Indian tribal organization self-designated § 130.6(c)(2) if:

(1) The areawide agency requests such cancellation; or

(2) The areawide agency fails to meet its planning requirements as specified in grant agreements, contracts or memoranda of understanding; or

(3) The areawide agency no longer has the resources or the commitment to continue water quality planning activities within the designated boundaries.

(c) *Impact of de-designation.* Once an areawide planning agency's designation has been withdrawn the State agency shall assume direct responsibility for continued water quality planning and oversight of implementation within the area.

(d) *Designated management agencies (DMA).* In accordance with section 208(c)(1) of the Act, management agencies shall be designated by the Governor in consultation with the designated planning agency. EPA shall approve such designations unless the DMA lacks the legal, financial and managerial authority required under section 208(c)(2) of the Act. Designated management agencies shall carry out responsibilities specified in Water Quality Management (WQM) plans. Areawide planning agencies shall monitor DMA activities in their area and recommend necessary plan changes during the WQM plan update. Where there is no designated areawide planning agency, States shall monitor DMA activities and make any necessary changes during the WQM plan update.

§ 130.10 State submittals to EPA.

(a) The following must be submitted regularly by the States to EPA:

(1) The section 305(b) report, in FY 84 and every two years thereafter, and the annual section 205(j) certification or update of the 305(b) water quality report; (Approved by OMB under the control number 2040-0071)

(2) The annual State work
rogram(s) under sections 106 and
05(j) of the Act; and (Approved by
MB under the control number 2010-
004)

(3) Revisions or additions to water
uality standards (WQS) (303(c)). (Ap-
roved by OMB under 2040-0049)

(b) The Act also requires that each
tate initially submit to EPA and
evise as necessary the following:

(1) Continuing planning process
CPP) (303(e));

(2) Identification and a ranking by
iority of water quality limited seg-
ents (303(d));

(3) Total maximum daily loads
MDLs) (303(d)); and

(4) Water quality management
VQM) plan and certified and ap-
oved WQM plan updates (208,
3(e)). (Paragraph (b)(1), (4) ap-
oved by OMB under the control
mber 2010-0004).

c) The form and content of required
ate submittals to EPA may be tai-
ed to reflect the organization and
eds of the State, as long as the re-
irements and purposes of the Act,
s part and, where applicable, 40
R Parts 29, 30, 33 and 35, Subparts
and J are met. The need for revision
d schedule of submittals shall be
eed to annually with EPA as the
tes annual work program is devel-
ed.

d) Not later than February 4, 1989,
h State shall submit to EPA for
iew, approval, and implementa-
n—

l) A list of those waters within the
te which after the application of
uent limitations required under
tion 301(b)(2) of the CWA cannot
sonably be anticipated to attain or
ntain (i) water quality standards
such waters reviewed, revised, or
pted in accordance with section
(c)(2)(B) of the CWA, due to toxic
utants, or (ii) that water quality
ch shall assure protection of public
lth, public water supplies, agricul-
l and industrial uses, and the pro-
ion and propagation of a balanced
ulation of shellfish, fish and wild-
and allow recreational activities in
on the water;

) A list of all navigable waters in
State for which the State does
not expect the applicable standard under section 303 of the CWA will be achieved after the requirements of sections 301(b), 306, and 307(b) are met, due entirely or substantially to discharges from point sources of any toxic pollutants listed pursuant to section 307(a);

(3) For each segment of navigable waters included on such list, a determination of the specific point source discharging any such toxic pollutant which is believed to be preventing or impairing such water quality and the amount of each such toxic pollutant discharged by each such source.

(4) For the purposes of listing waters under § 130.10(d)(2), "applicable standard" means a numeric criterion for a priority pollutant promulgated as part of a state water quality standard. Where a state numeric criterion for a priority pollutant is not promulgated as part of a state water quality standard, for the purposes of listing waters "applicable standard" means the state narrative water quality criterion to control a priority pollutant (e.g., no toxics in toxic amounts) interpreted on a chemical-by-chemical basis by applying a proposed state cirterion, an explicit state policy or regulation, or an EPA national water quality criterion, supplemented with other relevant information.

(5) If a water meets either of the two conditions listed below the water must be listed under § 130.10(d)(2) on the grounds that the applicable standard is not achieved or expected to be achieved due entirely or substantially to discharges from point sources.

(i) Existing or additional water quality-based limits on one or more point sources would result in the achievement of an applicable water quality standard for a toxic pollutant; or

(ii) The discharge of a toxic pollutant from one or more point sources, regardless of any nonpoint source contribution of the same pollutant, is sufficient to cause or is expected to cause an excursion above the applicable water quality standard for the toxic pollutant.

(6) Each state shall assemble and evaluate all existing and readily available water quality-related data and information and each state shall develop

the lists required by paragraphs (d)(1), (2), and (3) of this section based upon this data and information. At a minimum, all existing and readily available water quality-related data and information includes, but is not limited to, all of the existing and readily available data about the following categories of waters in the state:

(i) Waters where fishing or shellfish bans and/or advisories are currently in effect or are anticipated.

(ii) Waters where there have been repeated fishkills or where abnormalities (cancers, lesions, tumors, etc.) have been observed in fish or other aquatic life during the last ten years.

(iii) Waters where there are restrictions on water sports or recreational contact.

(iv) Waters identified by the state in its most recent state section 305(b) report as either "partially achieving" or "not achieving" designated uses.

(v) Waters identified by the states under section 303(d) of the CWA as waters needing water quality-based controls.

(vi) Waters identified by the state as priority waterbodies. (State Water Quality Management plans often include priority waterbody lists which are those waters that most need water pollution control decisions to achieve water quality standards or goals.)

(vii) Waters where ambient data indicate potential or actual exceedances of water quality criteria due to toxic pollutants from an industry classified as a primary industry in Appendix A of 40 CFR Part 122.

(viii) Waters for which effluent toxicity test results indicate possible or actual exceedances of state water quality standards, including narrative "free from" water quality criteria or EPA water quality criteria where state criteria are not available.

(ix) Waters with primary industrial major dischargers where dilution analyses indicate exceedances of state narrative or numeric water quality criteria (or EPA water quality criteria where state standards are not available) for toxic pollutants, ammonia, or chlorine. These dilution analyses must be based on estimates of discharge levels derived from effluent guidelines development documents, NPDES permits or permit application data (
Form 2C), Discharge Monitoring
ports (DMRs), or other available in
mation.

(x) Waters with POTW dischar
requiring local pretreatment progr
where dilution analyses indicate ex
dances of state water quality crit
(or EPA water quality criteria wh
state water quality criteria are
available) for toxic pollutants, am
nia, or chlorine. These dilution an
ses must be based upon data fr
NPDES permits or permit applicati
(e.g., Form 2C), Discharge Monitor
Reports (DMRs), or other available
formation.

(xi) Waters with facilities not incl
ed in the previous two categories su
as major POTWs, and industrial mi
dischargers where dilution analyses
dicate exceedances of numeric or n
rative state water quality criteria
EPA water quality criteria where st
water quality criteria are not av
able) for toxic pollutants, ammonia,
chlorine. These dilution analyses mu
be based upon estimates of dischar
levels derived from effluent guideli
development documents, NPDES pe
mits or permit application data, D
charge Monitoring Reports (DMR
or other available information.

(xii) Waters classified for uses th
will not support the "fishable/swi
mable" goals of the Clean Water Ac

(xiii) Waters where ambient toxici
or adverse water quality conditio
have been reported by local, sta
EPA or other Federal Agencies, th
private sector, public interest group
or universities. These organizatio
and groups should be actively solicite
for research they may be conductin
or reporting. For example, universit
researchers, the United States Depart
ment of Agriculture, the National Oce
anic and Atmospheric Administratio
the United States Geological Survey
and the United States Fish and Wild
life Service are good sources of fie
data and research.

(xiv) Waters identified by the sta
as impaired in its most recent Clea
Lake Assessments conducted unde
section 314 of the Clean Water Act.

(xv) Waters identified as impaire
by nonpoint sources in the *Americ*
Clean Water: The States' Nonpoi

Source Assessments 1985 (Association of State and Interstate Water Pollution Control Administrators (ASIWPCA)) or waters identified as impaired or threatened in a nonpoint source assessment submitted by the state to EPA under section 319 of the Clean Water Act.

(xvi) Surface waters impaired by pollutants from hazardous waste sites on the National Priority List prepared under section 105(8)(A) of CERCLA.

(7) Each state shall provide documentation to the Regional Administrator to support the state's determination to list or not to list waters as required by paragraphs (d)(1), (d)(2) and (d)(3) of this section. This documentation shall be submitted to the Regional Administrator together with the lists required by paragraphs (d)(1), (d)(2), and (d)(3) of this section and shall include as a minimum:

(i) A description of the methodology used to develop each list;

(ii) A description of the data and information used to identify waters and sources including a description of the data and information used by the state as required by paragraph (d)(6) of this section;

(iii) A rationale for any decision not to use any one of the categories of existing and readily available data required by paragraph (d)(6) of this section; and

(iv) Any other information requested by the Regional Administrator that is reasonable or necessary to determine the adequacy of a state's lists. Upon request by the Regional Administrator, each state must demonstrate good cause for not including a water or waters on one or more lists. Good cause includes, but is not limited to, more recent or accurate data; more accurate water quality modeling; flaws in the original analysis that led to the water being identified in a category in § 130.10(d)(6); or changes in conditions, e.g., new control equipment, or elimination of discharges.

(8) The Regional Administrator shall approve or disapprove each list required by paragraphs (d)(1), (d)(2), and (d)(3) of this section no later than June 4, 1989. The Regional Administrator shall approve each list required under paragraphs (d)(1), (d)(2), and (d)(3) of this section only if it meets the regulatory requirements for listing under paragraphs (d)(1), (d)(2), and (d)(3) of this section and if the state has met all the requirements of paragraphs (d)(6) and (d)(7) of this section.

(9) If a state fails to submit lists in accordance with paragraph (d) of this section or the Regional Administrator does not approve the lists submitted by such state in accordance with this paragraph, then not later than June 4, 1990, the Regional Administrator, in cooperation with such state, shall implement the requirements of CWA section 304(l) (1) and (2) in such state.

(10) If the Regional Administrator disapproves a state's decision with respect to one or more of the waters required under paragraph (d) (1), (2), or (3) of this section, or one or more of the individual control strategies required pursuant to section 304(l)(1)(D), then not later than June 4, 1989, the Regional Administrator shall distribute the notice of approval or disapproval given under this paragraph to the appropriate state Director. The Regional Administrator shall also publish a notice of availability, in a daily or weekly newspaper with state-wide circulation or in the FEDERAL REGISTER, for the notice of approval or disapproval. The Regional Administrator shall also provide written notice to each discharger identified under section 304(l)(1)(C), that EPA has listed the discharger under section 304(l)(1)(C). The notice of approval and disapproval shall include the following:

(i) The name and address of the EPA office that reviews the state's submittals.

(ii) A brief description of the section 304(l) process.

(iii) A list of waters, point sources and pollutants disapproved under this paragraph.

(iv) If the Regional Administrator determines that a state did not provide adequate public notice and an opportunity to comment on the lists prepared under this section, or if the Regional Administrator chooses to exercise his or her discretion, a list of waters, point sources, or pollutants approved under this paragraph.

(v) The name, address, and telephone number of the person at the Regional Office from whom interested persons may obtain more information.

(vi) Notice that written petitions or comments are due within 120 days.

(11) As soon as practicable, but not later than June 4, 1990, the Regional Office shall issue a response to petitions or comments received under paragraph (d)(10) of this section. Notice shall be given in the same manner as notice described in paragraph (d)(10) of this section, except for the following changes to the notice of approvals and disapprovals:

(i) The lists of waters, point sources and pollutants must reflect any changes made pursuant to comments or petitions received.

(ii) A brief description of the subsequent steps in the section 304(l) process shall be included.

[50 FR 1779, Jan. 11, 1985, as amended at 54 FR 258, Jan. 4, 1989; 54 FR 23897, June 2, 1989]

§ 130.11 Program management.

(a) State agencies may apply for grants under sections 106, 205(j) and 205(g) to carry out water quality planning and management activities. Interstate agencies may apply for grants under section 106 to carry out water quality planning and management activities. Local or regional planning organizations may request 106 and 205(j) funds from a State for planning and management activities. Grant administrative requirements for these funds appear in 40 CFR Parts 25, 29, 30, 33 and 35, Subparts A and J.

(b) Grants under section 106 may be used to fund a wide range of activities, including but not limited to assessments of water quality, revision of water quality standards (WQS), development of alternative approaches to control pollution, implementation and enforcement of control measures and development or implementation of ground water programs. Grants under section 205(j) may be used to fund water quality management (WQM) planning activities but may not be used to fund implementation of control measures (see Part 35, Subpart A). Section 205(g) funds are used primarily to manage the wastewater treatment works construction grants p gram pursuant to the provisions of CFR Part 35, Subpart J. A State m also use part of the 205(g) funds to minister approved permit progra under sections 402 and 404, to admin ter a statewide waste treatment m agement program under secti 208(b)(4) and to manage waste tre ment construction grants for sm communities.

(c) Grant work programs for wa quality planning and manageme shall describe geographic and fu tional priorities for use of grant fun in a manner which will facilitate E review of the grant application a subsequent evaluation of work acco plished with the grant funds. A Stat 305(b) Report, WQM plan and oth water quality assessments shall iden fy the State's priority water quali problems and areas. The WQM pl shall contain an analysis of alternati control measures and recommend tions to control specific problem Work programs shall specify the a tivities to be carried out during t period of the grant; the cost of specif activities; the outputs, for exampl permits issued, intensive surveys, wa teload allocations, to be produced b each activity; and where applicabl schedules indicating when activiti are to be completed.

(d) State work programs under se tions 106, 205(j) and 205(g) shall be c ordinated in a manner which indicate the funding from these grants dedica ed to major functions, such as permi ting, enforcement, monitoring, pla ning and standards, nonpoint sour implementation, management of co struction grants, operation and mai tenance of treatment works, ground water, emergency response and pr gram management. States shall al describe how the activities funded b these grants are used in a coordinate manner to address the priority wate quality problems identified in th State's water quality assessment unde section 305(b).

(e) EPA, States, areawide agencie interstate agencies, local and Regiona governments, and designated manage ment agencies (DMAs) are joint par ticipants in the water pollution contro program. States may enter into con tractual arrangements or intergovernmental agreements with other agencies concerning the performance of water quality planning and management tasks. Such arrangements shall reflect the capabilities of the respective agencies and shall efficiently utilize available funds and funding eligibilities to meet Federal requirements commensurate with State and local priorities. State work programs under section 205(j) shall be developed jointly with local, Regional and other comprehensive planning organizations.

§ 130.12 Coordination with other programs.

(a) Relationship to the National Pollutant Discharge Elimination System (NPDES) program. In accordance with section 208(e) of the Act, no NPDES permit may be issued which is in conflict with an approved Water Quality Management (WQM) plan. Where a State has assumed responsibility for the administration of the permit program under section 402, it shall assure consistency with the WQM plan.

(b) Relationship to the municipal construction grants program. In accordance with sections 205(j), 216 and 303(e)(3)(H) of the Act, each State shall develop a system for setting priorities for funding construction of municipal wastewater treatment facilities under section 201 of the Act. The State, or the agency to which the State has delegated WQM planning functions, shall review each facility plan in its area for consistency with the approved WQM plan. Under section 208(d) of the Act, after a waste treatment management agency has been designated and a WQM plan approved, section 201 construction grant funds may be awarded only to those agencies for construction of treatment works in conformity with the approved WQM plan.

(c) Relationship to Federal activities—Each department, agency or instrumentality of the executive, legislative and judicial branches of the Federal Government having jurisdiction over any property or facility or engaged in any activity resulting, or which may result, in the discharge or runoff of pollutants shall comply with all Federal, State, interstate and local requirements, administrative authority, and process and sanctions respecting the control and abatement of water pollution in the same manner and extent as any non-governmental entity in accordance with section 313 of the CWA.

§ 130.15 Processing application for treatment as a State.

(a) The Regional Administrator shall process an application of an Indian Tribe for treatment as a State submitted under § 130.6(d) in a timely manner. He shall promptly notify the Indian Tribe of receipt of the application.

(b) Within 15 days after receipt of the Indian Tribe's complete application for treatment as a State, the Regional Administrator shall issue notice to all appropriate governmental entities. Notice shall include information on the substance of and basis for the Tribe's assertion related to § 130.6(d)(2).

(c) Each governmental entity so notified by the Regional Administrator shall have 15 days to comment, except that the Regional Administrator is authorized to provide for a 30-day comment period. Comments by governmental entities shall be limited to the Tribe's assertion related to § 130.6(d)(2).

(d) If any water resources are subject to a competing or conflicting claim regarding the Tribe's assertions related to 130.6(d)(2), the Regional Administrator shall, prior to making his determination, consult with the Secretary of the Interior or his designee and, as appropriate, with the Tribe and any governmental entity making such a claim.

[54 FR 14360, Apr. 11, 1989]

PART 131—WATER QUALITY STANDARDS

Subpart A—General Provisions

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AUTHORITY: Clean Water Act, Pub. L. 92-500, as amended: 33 U.S.C. 1251 *et seq.*

SOURCE: 48 FR 51405, Nov. 8, 1983, unless otherwise noted.

Subpart A—General Provisions

§ 131.1 Scope.

This part describes the requirements and procedures for developing, reviewing, revising and approving water quality standards by the States as authorized by section 303(c) of the Clean Water Act. The reporting or recordkeeping (information) provisions in this rule were approved by the Office of Management and Budget under 3504(b) of the Paperwork Reduction Act of 1980, U.S.C. 3501 *et seq.* (Approval number 2040-0049).

§ 131.2 Purpose.

A water quality standard defines the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses. States adopt water quality standards to protect public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act (the Act). "Serve the purposes of the Act" (as defined in sections 101(a)(2) and 303(c) of the Act) means that water quality standards should, wherever attainable, provide water quality for the protection and propagation of fish, shellfish and wildlife and for recreation in and on the water and take into consideration their use and value of public water supplies, propagation of fish, shellfish, and wildlife, recreation in and on the water, and agricultural, industrial, and other purposes including navigation.

Such standards serve the dual purposes of establishing the water quality goals for a specific water body and serve as the regulatory basis for the establishment of water-quality-based treatment controls and strategies beyond the technology-based levels of treatment required by sections 301(b) and 306 of the Act.

§ 131.3 Definitions.

(a) *The Act* means the Clean Water Act (Pub. L. 92-500, as amended, (33 U.S.C. 1251 *et seq.*)).

(b) *Criteria* are elements of State water quality standards, expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use. When criteria are met, water quality will generally protect the designated use.

(c) *Section 304(a) criteria* are developed by EPA under authority of section 304(a) of the Act based on the latest scientific information on the relationship that the effect of a constituent concentration has on particular aquatic species and/or human health. This information is issued periodically to the States as guidance for use in developing criteria.

(d) *Toxic pollutants* are those pollutants listed by the Administrator under section 307(a) of the Act.

(e) *Existing uses* are those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards.

(f) *Designated uses* are those uses specified in water quality standards for each water body or segment whether or not they are being attained.

(g) *Use attainability analysis* is a structured scientific assessment of the factors affecting the attainment of the use which may include physical, chemical, biological, and economic factors as described in § 131.10(g).

(h) *Water quality limited segment* means any segment where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards, even after the application of the technology-bases effluent limitations required by sections 301(b) and 306 of the Act.

(i) *Water quality standards* are provisions of State or Federal law which consist of a designated use or uses for the waters of the United States and water quality criteria for such waters based upon such uses. Water quality standards are to protect the public health or welfare, enhance the quality of water and serve the purposes of the Act.

(j) *States* include: The 50 States, the District of Columbia, Guam, the Commonwealth of Puerto Rico, Virgin Islands, American Samoa, the Trust Territory of the Pacific Islands, and the Commonwealth of the Northern Mariana Islands.

§ 131.4 State authority.

States are responsible for reviewing, establishing and revising water quality standards. Under section 510 of the Act, States may develop water quality standards more stringent than required by this regulation.

§ 131.5 EPA authority.

Under section 303(c) of the Act, EPA is to review and to approve or disapprove State-adopted water quality standards. The review involves a determination of:

(a) Whether the State has adopted water uses which are consistent with the requirements of the Clean Water Act;

(b) Whether the state has adopted criteria that protect the designated water uses;

(c) Whether the State has followed its legal procedures for revising or adopting standards;

(d) Whether the State standards which do not include the uses specified in section 101(a)(2) of the Act are based upon appropriate technical and scientific data and analyses, and

(e) Whether the State submission meets the requirements included in § 131.6 of this part. If EPA determines that State water quality standards are consistent with the factors listed in paragraphs (a) through (e) of this section, EPA approves the standards. EPA must disapprove the State water quality standards and promulgate Federal standards under section 303(c)(4) of the Act, if State adopted standards are not consistent with the factors listed in paragraphs (a) through (e) of this section. EPA may also promulgate a new or revised standard where necessary to meet the requirements of the Act.

§ 131.6 Minimum requirements for water quality standards submission.

The following elements must be included in each State's water quality standards submitted to EPA for review:

(a) Use designations consistent with the provisions of sections 101(a)(2) and 303(c)(2) of the Act.

(b) Methods used and analyses conducted to support water quality standards revisions.

(c) Water quality criteria sufficient to protect the designated uses.

(d) An antidegradation policy consistent with § 131.12.

(e) Certification by the State Attorney General or other appropriate legal authority within the State that the water quality standards were duly adopted pursuant to State law.

(f) General information which will aid the Agency in determining the adequacy of the scientific basis of the standards which do not include the uses specified in section 101(a)(2) of the Act as well as information on general policies applicable to State standards which may affect their application and implementation.

Subpart B—Establishment of Water Quality Standards

§ 131.10 Designation of uses.

(a) Each State must specify appropriate water uses to be achieved and protected. The classification of the waters of the State must take into consideration the use and value of water for public water supplies, protection and propagation of fish, shellfish and wildlife, recreation in and on the water, agricultural, industrial, and other purposes including navigation. In no case shall a State adopt waste transport or waste assimilation as a designated use for any waters of the United States.

(b) In designating uses of a water body and the appropriate criteria for those uses, the State shall take into consideration the water quality standards of downstream waters and shall ensure that its water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters.

(c) States may adopt sub-categories of a use and set the appropriate criteria to reflect varying needs of such sub-categories of uses, for instance, to differentiate between cold water and warm water fisheries.

(d) At a minimum, uses are deemed attainable if they can be achieved by the imposition of effluent limits required under sections 301(b) and 306 of the Act and cost-effective and reasonable best management practices for nonpoint source control.

(e) Prior to adding or removing any use, or establishing sub-categories of a use, the State shall provide notice and an opportunity for a public hearing under § 131.20(b) of this regulation.

(f) States may adopt seasonal uses as an alternative to reclassifying a water body or segment thereof to uses requiring less stringent water quality criteria. If seasonal uses are adopted, water quality criteria should be adjusted to reflect the seasonal uses, however, such criteria shall not preclude the attainment and maintenance of a more protective use in another season.

(g) States may remove a designated use which is *not* an existing use, as defined in § 131.3, or establish sub-categories of a use if the State can demonstrate that attaining the designated use is not feasible because:

(1) Naturally occurring pollutant concentrations prevent the attainment of the use; or

(2) Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or

(3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or

(4) Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or

(5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or

(6) Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.

(h) States may not remove designated uses if:

(1) They are existing uses, as defined in § 131.3, unless a use requiring more stringent criteria is added; or

(2) Such uses will be attained by implementing effluent limits required under sections 301(b) and 306 of the Act and by implementing cost-effective and reasonable best management practices for nonpoint source control.

(i) Where existing water quality standards specify designated uses less than those which are presently being attained, the State shall revise its standards to reflect the uses actually being attained.

(j) A State must conduct a use attainability analysis as described in § 131.3(g) whenever:

(1) The State designates or has desnated uses that do not include the ses specified in section 101(a)(2) of ne Act, or

(2) The State wishes to remove a esignated use that is specified in secon 101(a)(2) of the Act or to adopt bcategories of uses specified in secon 101(a)(2) of the Act which require ss stringent criteria.

(k) A State is not required to conct a use attainability analysis under is regulation whenever designating es which include those specified in ction 101(a)(2) of the Act.

31.11 Criteria.

a) *Inclusion of pollutants:* (1) States st adopt those water quality crite- that protect the designated use. ch criteria must be based on sound entific rationale and must contain fficient parameters or constituents protect the designated use. For ters with multiple use designations, criteria shall support the most sitive use.

2) *Toxic pollutants.* States must iew water quality data and informan on discharges to identify specific ter bodies where toxic pollutants y be adversely affecting water qual- or the attainment of the designat- water use or where the levels of ic pollutants are at a level to war- t concern and must adopt criteria such toxic pollutants applicable to water body sufficient to protect designated use. Where a State pts narrative criteria for toxic pol- ants to protect designated uses, the te must provide information identi- g the method by which the State ends to regulate point source dis- rges of toxic pollutants on water lity limited segments based on h narrative criteria. Such informa- may be included as part of the ndards or may be included in docunts generated by the State in re- nse to the Water Quality Planning Management Regulations (40 R Part 35).

) Form of criteria: In establishing eria, States should:

) Establish numerical values based

) 304(a) Guidance; or

(ii) 304(a) Guidance modified to reflect site-specific conditions; or

(iii) Other scientifically defensible methods;

(2) Establish narrative criteria or criteria based upon biomonitoring methods where numerical criteria cannot be established or to supplement numerical criteria.

§ 131.12 Antidegradation policy.

(a) The State shall develop and adopt a statewide antidegradation policy and identify the methods for implementing such policy pursuant to this subpart. The antidegradation policy and implementation methods shall, at a minimum, be consistent with the following:

(1) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.

(2) Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.

(3) Where high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

(4) In those cases where potential water quality impairment associated

with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with section 316 of the Act.

§ 131.13 General policies.

States may, at their discretion, include in their State standards, policies generally affecting their application and implementation, such as mixing zones, low flows and variances. Such policies are subject to EPA review and approval.

Subpart C—Procedures for Review and Revision of Water Quality Standards

§ 131.20 State review and revision of water quality standards.

(a) *State review.* The State shall from time to time, but at least once every three years, hold public hearings for the purpose of reviewing applicable water quality standards and, as appropriate, modifying and adopting standards. Any water body segment with water quality standards that do not include the uses specified in section 101(a)(2) of the Act shall be re-examined every three years to determine if any new information has become available. If such new information indicates that the uses specified in section 101(a)(2) of the Act are attainable, the State shall revise its standards accordingly. Procedures States establish for identifying and reviewing water bodies for review should be incorporated into their Continuing Planning Process.

(b) *Public participation.* The State shall hold a public hearing for the purpose of reviewing water quality standards, in accordance with provisions of State law, EPA's water quality management regulation (40 CFR 130.3(b)(6)) and public participation regulation (40 CFR Part 25). The proposed water quality standards revision and supporting analyses shall be made available to the public prior to the hearing.

(c) *Submittal to EPA.* The State shall submit the results of the review, any supporting analysis for the use attainability analysis, the methodologies used for site-specific criteria development, any general policies applicable to water quality standards and any r visions of the standards to the Regio al Administrator for review and a proval, within 30 days of the fin State action to adopt and certify th revised standard, or if no revisions a made as a result of the review, with 30 days of the completion of th review.

§ 131.21 EPA review and approval water quality standards.

(a) After the State submits its of cially adopted revisions, the Regiona Administrator shall either:

(1) Notify the State within 60 da that the revisions are approved, or

(2) Notify the State within 90 da that the revisions are disapprove Such notification of disapproval shal specify the changes needed to assu compliance with the requirements the Act and this regulation, and shal explain why the State standard is n in compliance with such requiremen Any new or revised State standar must be accompanied by some type supporting analysis.

(b) The Regional Administrator's ap proval or disapproval of a State wate quality standard shall be based on th requirements of the Act as describe in §§ 131.5, and 131.6.

(c) A State water quality standar remains in effect, even though disap proved by EPA, until the State revise it or EPA promulgates a rule that su persedes the State water quality standard.

(d) EPA shall, at least annually, pub lish in the Federal Register a notic of approvals under this section.

§ 131.22 EPA promulgation of water qu ity standards.

(a) If the State does not adopt th changes specified by the Regional Ad ministrator within 90 days after notifi cation of the Regional Administrator disapproval, the Administrator shal promptly propose and promulga such standard.

(b) The Administrator may also pro pose and promulgate a regulation, ap plicable to one or more States, settin forth a new or revised standard upo determining such a standard is nece sary to meet the requirements of the Act.

(c) In promulgating water quality standards, the Administrator is subject to the same policies, procedures, analyses, and public participation requirements established for States in these regulations.

Subpart D—Federally Promulgated Water Quality Standards

§ 131.31 Arizona.

(a) Article 6, Part 2 is amended as follows:

(1) Reg. 6-2-6.11 shall read:

Reg. 6-2-6.11 Nutrient Standards. A. The mean annual total phosphate and mean annual total nitrate concentrations of the following waters shall not exceed the values given below nor shall the total phosphate or total nitrate concentrations of more than 10 percent of the samples in any year exceed the 90 percent values given below. Unless otherwise specified, indicated values also apply to tributaries to the named waters.

	Mean 90 pct annual value	
	Total phosphates as PO_4mg/l	Total nitrates as NO_3mg/l
1. Colorado River from Utah border to Willow Beach (main stem)	0.04–0.06	4–7
2. Colorado River from Willow Beach to Parker Dam (main stem)	0.06–0.10	5
3. Colorado River from Parker Dam to Imperial Dam (main stem)	0.08–0.12	5–7
4. Colorado River from Imperial Dam to Morelos Dam (main stem)	0.10–0.10	5–7
5. Gila River from New Mexico border to San Carlos Reservoir (excluding San Carlos Reservoir)	0.50–0.80	
6. Gila River from San Carlos Reservoir to Ashurst Hayden Dam (including San Carlos Reservoir)	0.30–0.50	
7. San Pedro River	0.30–0.50	
8. Verde River (except Granite Creek)	0.20–0.30	
9. Salt River above Roosevelt Lake	0.20–0.30	
0. Santa Cruz River from international boundary near Nogales to Sahuarita	0.50–0.80	
1. Little Colorado River above Lyman Reservoir	0.30–0.50	

B. The above standards are intended to protect the beneficial uses of the named waters. Because regulation of nitrates and phosphates alone may not be adequate to protect waters from eutrophication, no substance shall be added to any surface water which produces aquatic growth to the extent that such growths create a public nuisance or interference with beneficial uses of the water defined and designated in Reg. 6-2-6.5.

(2) Reg. 6-2-6.10 Subparts A and B are amended to include Reg. 6-2-6.11 in series with Regs. 6-2-6.6, 6-2-6.7 and 6-2-6.8.

(Sec. 303, Federal Water Pollution Control Act, as amended, 33 U.S.C. 1313, 86 Stat. 816 *et seq.*, Pub. L. 92-500; Clean Water Act, Pub. L. 92-500, as amended; 33 U.S.C. 1251 *et seq.*)

[41 FR 25000, June 22, 1976; 41 FR 48737, Nov. 5, 1976. Redesignated and amended at 42 FR 56740, Oct. 28, 1977. Further redesignated and amended at 48 FR 51408, Nov. 8, 1983]

§ 131.33 [Reserved]

§ 131.34 Kentucky.

In 401 KAR 5:031, section 4(i), Table 1, entitled, "Warmwater Aquatic Habitat Criteria," the concentration for "chloride" is superseded. The applicable concentration for "chloride" shall be as follows: 600 mg/1 as a 30-day average, not to exceed a maximum of 1,200 mg/1 at any time.

[52 FR 9105, Mar. 20, 1987]

§ 131.35 Colville Confederated Tribes Indian Reservation.

The water quality standards applicable to the waters within the Colville Indian Reservation, located in the State of Washington.

(a) *Background.* (1) It is the purpose of these Federal water quality standards to prescribe minimum water quality requirements for the surface waters located within the exterior boundaries of the Colville Indian Reservation to ensure compliance with section 303(c) of the Clean Water Act.

(2) The Colville Confederated Tribes have a primary interest in the protection, control, conservation, and utilization of the water resources of the Colville Indian Reservation. Water quality standards have been enacted into

tribal law by the Colville Business Council of the Confederated Tribes of the Colville Reservation, as the Colville Water Quality Standards Act, CTC Title 33 (Resolution No. 1984-526 (August 6, 1984) as amended by Resolution No. 1985-20 (January 18, 1985)).

(b) *Territory Covered.* The provisions of these water quality standards shall apply to all surface waters within the exterior boundaries of the Colville Indian Reservation.

(c) *Applicability, Administration and Amendment.* (1) The water quality standards in this section shall be used by the Regional Administrator for establishing any water quality based National Pollutant Discharge Elimination System Permit (NPDES) for point sources on the Colville Confederated Tribes Reservation.

(2) In conjunction with the issuance of section 402 or section 404 permits, the Regional Administrator may designate mixing zones in the waters of the United States on the reservation on a case-by-case basis. The size of such mixing zones and the in-zone water quality in such mixing zones shall be consistent with the applicable procedures and guidelines in EPA's Water Quality Standards Handbook and the Technical Support Document for Water Quality Based Toxics Control.

(3) Amendments to the section at the request of the Tribe shall proceed in the following manner.

(i) The requested amendment shall first be duly approved by the Confederated Tribes of the Colville Reservation (and so certified by the Tribes Legal Counsel) and submitted to the Regional Administrator.

(ii) The requested amendment shall be reviewed by EPA (and by the State of Washington, if the action would affect a boundary water).

(iii) If deemed in compliance with the Clean Water Act, EPA will propose and promulgate an appropriate change to this section.

(4) Amendment of this section at EPA's initiative will follow consultation with the Tribe and other appropriate entities. Such amendments will then follow normal EPA rulemaking procedures.

(5) All other applicable provisions of this Part 131 shall apply on the Colville Confederated Tribes Reservation. Special attention should be paid to §§ 131.6, 131.10, 131.11 and 131.20 for any amendment to these standards to be initiated by the Tribe.

(6) All numeric criteria contained in this section apply at all in-stream flow rates greater than or equal to the flow rate calculated as the minimum 7-consecutive day average flow with a recurrence frequency of once in ten years (7Q10); narrative criteria (§ 131.35(e)(3)) apply regardless of flow. The 7Q10 low flow shall be calculated using methods recommended by the U.S. Geological Survey.

(d) *Definitions.* (1) "Acute toxicity" means a deleterious response (e.g., mortality, disorientation, immobilization) to a stimulus observed in 96 hours or less.

(2) "Background conditions" means the biological, chemical, and physical conditions of a water body, upstream from the point or non-point source discharge under consideration. Background sampling location in an enforcement action will be upstream from the point of discharge, but not upstream from other inflows. If several discharges to any water body exist, and an enforcement action is being taken for possible violations to the standards, background sampling will be undertaken immediately upstream from each discharge.

(3) "Ceremonial and Religious water use" means activities involving traditional Native American spiritual practices which involve, among other things, primary (direct) contact with water.

(4) "Chronic Toxicity" means the lowest concentration of a constituent causing observable effects (i.e., considering lethality, growth, reduced reproduction, etc.) over a relatively long period of time, usually a 28-day test period for small fish test species.

(5) "Council" or "Tribal Council" means the Colville Business Council of the Colville Confederated Tribes.

(6) "Geometric mean" means the "nth" root of a product of "n" factors.

(7) "Mean retention time" means the time obtained by dividing a reservoir's mean annual minimum total storage by the non-zero 30-day, ten-year low-flow from the reservoir.

(8) "Mixing Zone" or "dilution zone" means a limited area or volume of water where initial dilution of a discharge takes place; and where numeric water quality criteria can be exceeded but acutely toxic conditions are prevented from occurring.

(9) "pH" means the negative logarithm of the hydrogen ion concentration.

(10) "Primary contact recreation" means activities where a person would have direct contact with water to the point of complete submergence, including but not limited to skin diving, swimming, and water skiing.

(11) "Regional Administrator" means the Administrator of EPA's Region X.

(12) "Reservation" means all land within the limits of the Colville Indian Reservation, established on July 2, 1872 by Executive Order, presently containing 1,389,000 acres more or less, and under the jurisdiction of the United States government, notwithstanding the issuance of any patent, and including rights-of-way running through the reservation.

(13) "Secondary contact recreation" means activities where a person's water contact would be limited to the extent that bacterial infections of eyes, ears, respiratory, or digestive systems or urogenital areas would normally be avoided (such as wading or fishing).

(14) "Surface water" means all water above the surface of the ground within the exterior boundaries of the Colville Indian Reservation including but not limited to lakes, ponds, reservoirs, artificial impoundments, streams, rivers, springs, seeps and wetlands.

(15) "Temperature" means water temperature expressed in Centigrade degrees (C).

(16) "Total dissolved solids" (TDS) means the total filterable residue that passes through a standard glass fiber filter disk and remains after evaporation and drying to a constant weight at 180 degrees C. It is considered to be a measure of the dissolved salt content of the water.

(17) "Toxicity" means acute and/or chronic toxicity.

(18) "Tribe" or "Tribes" means the Colville Confederated Tribes.

(19) "Turbidity" means the clarity of water expressed as nephelometric turbidity units (NTU) and measured with a calibrated turbidimeter.

(20) "Wildlife habitat" means the waters and surrounding land areas of the Reservation used by fish, other aquatic life and wildlife at any stage of their life history or activity.

(e) *General considerations.* The following general guidelines shall apply to the water quality standards and classifications set forth in the use designation Sections.

(1) *Classification Boundaries.* At the boundary between waters of different classifications, the water quality standards for the higher classification shall prevail.

(2) *Antidegradation Policy.* This antidegradation policy shall be applicable to all surface waters of the Reservation.

(i) Existing in-stream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.

(ii) Where the quality of the waters exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the Regional Administrator finds, after full satisfaction of the inter-governmental coordination and public participation provisions of the Tribes' continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the Regional Administrator shall assure water quality adequate to protect existing uses fully. Further, the Regional Administrator shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.

(iii) Where high quality waters are identified as constituting an outstanding national or reservation resource, such as waters within areas designated as unique water quality management areas and waters otherwise of exceptional recreational or ecological significance, and are designated as special resource waters, that water quality shall be maintained and protected.

(iv) In those cases where potential water quality impairment associated with a thermal discharge is involved, this antidegradation policy's implementing method shall be consistent with section 316 of the Clean Water Act.

(3) *Aesthetic Qualities.* All waters within the Reservation, including those within mixing zones, shall be free from substances, attributable to wastewater discharges or other pollutant sources, that:

(i) Settle to form objectionable deposits;

(ii) Float as debris, scum, oil, or other matter forming nuisances;

(iii) Produce objectionable color, odor, taste, or turbidity;

(iv) Cause injury to, are toxic to, or produce adverse physiological responses in humans, animals, or plants; or

(v) produce undesirable or nuisance aquatic life.

(4) *Analytical Methods.* (i) The analytical testing methods used to measure or otherwise evaluate compliance with water quality standards shall to the extent practicable, be in accordance with the "Guidelines Establishing Test Procedures for the Analysis of Pollutants" (40 CFR Part 136). When a testing method is not available for a particular substance, the most recent edition of "Standard Methods for the Examination of Water and Wastewater" (published by the American Public Health Association, American Water Works Association, and the Water Pollution Control Federation) and other or superseding methods published and/or approved by EPA shall be used.

(f) *General Water Use and Criteria Classes.* The following criteria shall apply to the various classes of surface waters on the Colville Indian Reservation:

(1) *Class I (Extraordinary)*—(i) *Designated uses.* The designated uses include, but are not limited to, the following:

(A) Water supply (domestic, industrial, agricultural).

(B) Stock watering.

(C) Fish and shellfish: Salmonid migration, rearing, spawning, and harvesting; other fish migration, rearing, spawning, and harvesting.

(D) Wildlife habitat.

(E) Ceremonial and religious water use.

(F) Recreation (primary contact recreation, sport fishing, boating and aesthetic enjoyment).

(G) Commerce and navigation.

(ii) *Water quality criteria.* (A) Bacteriological Criteria. The geometric mean of the enterococci bacteria densities in samples taken over a 30 day period shall not exceed 8 per 100 milliliters, nor shall any single sample exceed an enterococci density of 3 per 100 milliliters. These limits are calculated as the geometric mean of the collected samples approximately equally spaced over a thirty day period.

(B) Dissolved oxygen—The dissolved oxygen shall exceed 9.5 mg/l.

(C) Total dissolved gas—concentrations shall not exceed 110 percent of the saturation value for gases at the existing atmospheric and hydrostatic pressures at any point of sample collection.

(D) Temperature—shall not exceed 16.0 degrees C due to human activities. Temperature increases shall not, at any time, exceed t=23/(T+5).

(*1*) When natural conditions exceed 16.0 degrees C, no temperature increase will be allowed which will raise the receiving water by greater than 0. degrees C.

(*2*) For purposes hereof, "t" represents the permissive temperature change across the dilution zone; and "T" represents the highest existing temperature in this water classification outside of any dilution zone.

(*3*) Provided that temperature increase resulting from nonpoint source activities shall not exceed 2.8 degrees C, and the maximum water temperature shall not exceed 10.3 degrees C.

(E) pH shall be within the range of 6.5 to 8.5 with a human-caused variation of less than 0.2 units.

(F) Turbidity shall not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU.

(G) Toxic, radioactive, nonconventional, or deleterious material concentrations shall be less than those of public health significance, or which may cause acute or chronic toxic conditions to the aquatic biota, or which may adversely affect designated water uses.

(2) *Class II (Excellent).*—(i) *Designated uses.* The designated uses include but are not limited to, the following:

(A) Water supply (domestic, industrial, agricultural).

(B) Stock watering.

(C) Fish and shellfish: Salmonid migration, rearing, spawning, and harvesting; other fish migration, rearing, pawning, and harvesting; crayfish earing, spawning, and harvesting.

(D) Wildlife habitat.

(E) Ceremonial and religious water use.

(F) Recreation (primary contact ecreation, sport fishing, boating and esthetic enjoyment).

(G) Commerce and navigation.

(ii) *Water quality criteria.* (A) Bacteiological Criteria—The geometric nean of the enterococci bacteria densities in samples taken over a 30 day eriod shall not exceed 16/100 ml, nor hall any single sample exceed an enerococci density of 75 per 100 milliliers. These limits are calculated as the eometric mean of the collected samles approximately equally spaced ver a thirty day period.

(B) Dissolved oxygen—The dissolved xygen shall exceed 8.0 mg/l.

(C) Total dissolved gas—concentraions shall not exceed 110 percent of he saturation value for gases at the xisting atmospheric and hydrostatic ressures at any point of sample colection.

(D) Temperature-shall not exceed 3.0 degrees C due to human activities. emperature increases shall not, at ny time, exceed t=28/(T+7).

(*1*) When natural conditions exceed 3 degrees C no temperature increase ill be allowed which will raise the reeiving water temperature by greater han 0.3 degrees C.

(*2*) For purposes hereof, "t" represents the permissive temperature change across the dilution zone; and "T" represents the highest existing temperature in this water classification outside of any dilution zone.

(*3*) Provided that temperature increase resulting from non-point source activities shall not exceed 2.8 degrees C, and the maximum water temperature shall not exceed 18.3 degrees C.

(E) pH shall be within the range of 6.5 to 8.5 with a human-caused variation of less than 0.5 units.

(F) Turbidity shall not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU.

(G) Toxic, radioactive, nonconventional, or deleterious material concentrations shall be less than those of public health significance, or which may cause acute or chronic toxic conditions to the aquatic biota, or which may adversely affect designated water uses.

(3) *Class III (Good).*—(i) *Designated uses.* The designated uses include but are not limited to, the following:

(A) Water supply (industrial, agricultural).

(B) Stock watering.

(C) Fish and shellfish: Salmonid migration, rearing, spawning, and harvesting; other fish migration, rearing, spawning, and harvesting; crayfish rearing, spawning, and harvesting.

(D) Wildlife habitat.

(E) Recreation (secondary contact recreation, sport fishing, boating and aesthetic enjoyment).

(F) Commerce and navigation.

(ii) *Water quality criteria.* (A) Bacteriological Criteria—The geometric mean of the enterococci bacteria densities in samples taken over a 30 day period shall not exceed 33/100 ml, nor shall any single sample exceed an enterococci density of 150 per 100 milliliters. These limits are calculated as the geometric mean of the collected samples approximately equally spaced over a thirty day period.

(B) Dissolved oxygen.

	Early life stages [1],[2]	Other life stages
7 day mean	9.5 (6.5)	[3] NA
1 day minimum [4]	8.0 (5.0)	6.5

[1] These are water column concentrations recommended to achieve the required intergravel dissolved oxygen concentrations shown in parentheses. The 3 mg/L differential is discussed in the dissolved oxygen criteria document (EPA 440/5-86-003, April 1986). For species that have early life stages exposed directly to the water column, the figures in parentheses apply.

[2] Includes all embryonic and larval stages and all juvenile forms to 30-days following hatching.

[3] NA (not applicable)

[4] All minima should be considered as instantaneous concentrations to be achieved at all times.

(C) Total dissolved gas concentrations shall not exceed 110 percent of the saturation value for gases at the existing atmospheric and hydrostatic pressures at any point of sample collection.

(D) Temperature shall not exceed 21.0 degrees C due to human activities. Temperature increases shall not, at any time, exceed $t=34/(T+9)$.

(*1*) When natural conditions exceed 21.0 degrees C no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3 degrees C.

(*2*) For purposes hereof, "t" represents the permissive temperature change across the dilution zone; and "T" represents the highest existing temperature in this water classification outside of any dilution zone.

(*3*) Provided that temperature increase resulting from nonpoint source activities shall not exceed 2.8 degrees C, and the maximum water temperature shall not exceed 21.3 degrees C.

(E) pH shall be within the range of 6.5 to 8.5 with a human-caused variation of less than 0.5 units.

(F) Turbidity shall not exceed 10 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 20 percent increase in turbidity when the background turbidity is more than 50 NTU.

(G) Toxic, radioactive, nonconventional, or deleterious material concentrations shall be less than those of public health significance, or which may cause acute or chronic toxic conditions to the aquatic biota, or which may adversely affect designated water uses.

(4) *Class IV (Fair)*—(i) *Designated uses.* The designated uses include but are not limited to, the following:

(A) Water supply (industrial).

(B) Stock watering.

(C) Fish (salmonid and other fish migration).

(D) Recreation (secondary contact recreation, sport fishing, boating and aesthetic enjoyment).

(E) Commerce and navigation.

(ii) *Water quality criteria.* (A) Dissolved oxygen.

	During periods of salmonid and other fish migration	During a other time periods
30 day mean	6.5	5.5
7 day mean	[1] NA	[1] NA
7 day mean minimum	5.0	4.0
1 day minimum [2]	4.0	3.0

[1] NA (not applicable).

[2] All minima should be considered as instantaneous concentrations to be achieved at all times.

(B) Total dissolved gas—concentrations shall not exceed 110 percent of the saturation value for gases at the existing atmospheric and hydrostatic pressures at any point of sample collection.

(C) Temperature shall not exceed 22.0 degrees C due to human activities. Temperature increases shall not, at any time, exceed $t=20/(T+2)$.

(*1*) When natural conditions exceed 22.0 degrees C, no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3 degrees C.

(*2*) For purposes hereof, "t" represents the permissive temperature change across the dilution zone; and "T" represents the highest existing temperature in this water classification outside of any dilution zone.

(D) pH shall be within the range of 6.5 to 9.0 with a human-caused variation of less than 0.5 units.

(E) Turbidity shall not exceed 10 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 20 percent increase in turbidity when the background turbidity is more than 50 NTU.

(F) Toxic, radioactive, nonconventional, or deleterious material concentrations shall be less than those of public health significance, or which may cause acute or chronic toxic conditions to the aquatic biota, or which may adversely affect designated water uses.

(5) *Lake Class*—(i) *Designated uses.* The designated uses include but are not limited to, the following:

(A) Water supply (domestic, industrial, agricultural).

(B) Stock watering.

(C) Fish and shellfish: Salmonid migration, rearing, spawning, and harvesting; other fish migration, rearing, spawning, and harvesting; crayfish rearing, spawning, and harvesting.

(D) Wildlife habitat.

(E) Ceremonial and religious water use.

(F) Recreation (primary contact recreation, sport fishing, boating and aesthetic enjoyment).

(G) Commerce and navigation.

(ii) *Water quality criteria.* (A) Bacteriological Criteria. The geometric mean of the enterococci bacteria densities in samples taken over a 30 day period shall not exceed 33/100 ml, nor shall any single sample exceed an enterococci density of 150 per 100 milliliters. These limits are calculated as the geometric mean of the collected samples approximately equally spaced over a thirty day period.

(B) Dissolved oxygen—no measurable decrease from natural conditions.

(C) Total dissolved gas concentrations shall not exceed 110 percent of the saturation value for gases at the existing atmospheric and hydrostatic pressures at any point of sample collection.

(D) Temperature—no measurable change from natural conditions.

(E) pH—no measurable change from natural conditions.

(F) Turbidity shall not exceed 5 NTU over natural conditions.

(G) Toxic, radioactive, nonconventional, or deleterious material concentrations shall be less than those which may affect public health, the natural aquatic environment, or the desirability of the water for any use.

(6) *Special Resource Water Class (SRW)*—(i) *General characteristics.* These are fresh or saline waters which comprise a special and unique resource to the Reservation. Water quality of this class will be varied and unique as determined by the Regional Administrator in cooperation with the Tribes.

(ii) *Designated uses.* The designated uses include, but are not limited to, the following:

(A) Wildlife habitat.

(B) Natural foodchain maintenance.

(iii) Water quality criteria.

(A) Enterococci bacteria densities shall not exceed natural conditions.

(B) Dissolved oxygen—shall not show any measurable decrease from natural conditions.

(C) Total dissolved gas shall not vary from natural conditions.

(D) Temperature—shall not show any measurable change from natural conditions.

(E) pH shall not show any measurable change from natural conditions.

(F) Settleable solids shall not show any change from natural conditions.

(G) Turbidity shall not exceed 5 NTU over natural conditions.

(H) Toxic, radioactive, or deleterious material concentrations shall not exceed those found under natural conditions.

(g) *General Classifications.* General classifications applying to various surface waterbodies not specifically classified under § 131.35(h) are as follows:

(1) All surface waters that are tributaries to Class I waters are classified Class I, unless otherwise classified.

(2) Except for those specifically classified otherwise, all lakes with existing average concentrations less than 2000 mg/L TDS and their feeder streams on the Colville Indian Reservation are classified as Lake Class and Class I, respectively.

(3) All lakes on the Colville Indian Reservation with existing average concentrations of TDS equal to or exceeding 2000 mg/L and their feeder streams are classified as Lake Class and Class I respectively unless specifically classified otherwise.

(4) All reservoirs with a mean detention time of greater than 15 days are classified Lake Class.

(5) All reservoirs with a mean detention time of 15 days or less are classified the same as the river section in which they are located.

(6) All reservoirs established on preexisting lakes are classified as Lake Class.

(7) All wetlands are assigned to the Special Resource Water Class.

(8) All other waters not specifically assigned to a classification of the reservation are classified as Class II.

(h) *Specific Classifications.* Specific classifications for surface waters of the Colville Indian Reservation are as follows:

(1) Streams:	
Alice Creek	Class III
Anderson Creek	Class III
Armstrong Creek	Class III
Barnaby Creek	Class II
Bear Creek	Class III
Beaver Dam Creek	Class II
Bridge Creek	Class II
Brush Creek	Class III
Buckhorn Creek	Class III
Cache Creek	Class III
Canteen Creek	Class I
Capoose Creek	Class III
Cobbs Creek	Class III
Columbia River from Chief Joseph Dam to Wells Dam.	
Columbia River from northern Reservation boundary to Grand Coulee Dam (Roosevelt Lake).	
Columbia River from Grand Coulee Dam to Chief Joseph Dam.	
Cook Creek	Class I
Cooper Creek	Class III
Cornstalk Creek	Class III
Cougar Creek	Class I
Coyote Creek	Class II
Deerhorn Creek	Class III
Dick Creek	Class III
Dry Creek	Class I
Empire Creek	Class III
Faye Creek	Class I
Forty Mile Creek	Class III
Gibson Creek	Class I
Gold Creek	Class II
Granite Creek	Class II
Grizzly Creek	Class III
Haley Creek	Class III
Hall Creek	Class II
Hall Creek, West Fork	Class I
Iron Creek	Class III
Jack Creek	Class III
Jerred Creek	Class I
Joe Moses Creek	Class III
John Tom Creek	Class III
Jones Creek	Class I
Kartar Creek	Class III
Kincaid Creek	Class III
King Creek	Class III
Klondyke Creek	Class I
Lime Creek	Class III
Little Jim Creek	Class III
Little Nespelem	Class II
Louie Creek	Class III
Lynx Creek	Class II
Manila Creek	Class III
McAllister Creek	Class III
Meadow Creek	Class III
Mill Creek	Class II
Mission Creek	Class III
Nespelem River	Class II
Nez Perce Creek	Class III
Nine Mile Creek	Class II
Nineteen Mile Creek	Class III
No Name Creek	Class II
North Nanamkin Creek	Class III
North Star Creek	Class III
Okanogan River from Reservation north boundary to Columbia River.	Class II
Olds Creek	Class I
Omak Creek	Class II
Onion Creek	Class II
Parmenter Creek	Class III
Peel Creek	Class III
Peter Dan Creek	Class III
Rock Creek	Class I
San Poil River	Class I
Sanpoil, River West Fork	Class II
Seventeen Mile Creek	Class III
Silver Creek	Class III
Sitdown Creek	Class III
Six Mile Creek	Class III
South Nanamkin Creek	Class III
Spring Creek	Class III
Stapaloop Creek	Class III
Stepstone Creek	Class III
Stranger Creek	Class II
Strawberry Creek	Class III
Swimptkin Creek	Class III
Three Forks Creek	Class I
Three Mile Creek	Class III
Thirteen Mile Creek	Class II
Thirty Mile Creek	Class II
Trail Creek	Class III
Twentyfive Mile Creek	Class III
Twentyone Mile Creek	Class III
Twentythree Mile Creek	Class III
Wannacot Creek	Class III
Wells Creek	Class I
Whitelaw Creek	Class III
Wilmont Creek	Class II
(2) Lakes:	
Apex Lake	LC
Big Goose Lake	LC
Bourgeau Lake	LC
Buffalo Lake	LC
Cody Lake	LC
Crawfish Lakes	LC
Camille Lake	LC
Elbow Lake	LC
Fish Lake	LC
Gold Lake	LC
Great Western Lake	LC
Johnson Lake	LC
LaFleur Lake	LC
Little Goose Lake	LC
Little Owhi Lake	LC
McGinnis Lake	LC
Nicholas Lake	LC
Omak Lake	SRW
Owhi Lake	SRW
Penley Lake	SRW
Rebecca Lake	LC
Round Lake	LC
Simpson Lake	LC
Soap Lake	LC
Sugar Lake	LC
Summit Lake	LC
Twin Lakes	SRW

[54 FR 28625, July 6, 1989]

PART 133—SECONDARY TREATMENT REGULATION

Sec.
133.100 Purpose.
133.101 Definitions.
133.102 Secondary treatment.
133.103 Special considerations.
133.104 Sampling and test procedures.
133.105 Treatment equivalent to secondary treatment.

AUTHORITY: Secs. 301(b)(1)(B), 304(d)(1), 304(d)(4), 308, and 501 of the Federal Water Pollution Control Act as amended by the Federal Water Pollution Control Act Amendments of 1972, the Clean Water Act of 1977, and the Municipal Wastewater Treatment Construction Grant Amendments of 1981; 33 U.S.C. 1311(b)(1)(B), 1314(d) (1) and (4), 1318, and 1361; 86 Stat. 816, Pub. L. 92-500; 91 Stat. 1567, Pub. L. 95-217; 95 Stat. 1623, Pub. L. 97-117.

SOURCE: 49 FR 37006, Sept. 20, 1984, unless otherwise noted.

§ 133.100 Purpose.

This part provides information on the level of effluent quality attainable through the application of secondary or equivalent treatment.

§ 133.101 Definitions.

Terms used in this part are defined as follows:

(a) *"7-day average."* The arithmetic mean of pollutant parameter values for samples collected in a period of 7 consecutive days.

(b) *"30-day average."* The arithmetic mean of pollutant parameter values of samples collected in a period of 30 consecutive days.

(c) *"Act."* The Clean Water Act (33 U.S.C. 1251 *et seq.*, as amended).

(d) *"BOD."* The five day measure of the pollutant parameter biochemical oxygen demand (BOD).

(e) *"$CBOD_5$."* The five day measure of the pollutant parameter carbonaceous biochemical oxygen demand ($CBOD_5$).

(f) *"Effluent concentrations consistently achievable through proper operation and maintenance."* (1) For a given pollutant parameter, the 95th percentile value for the 30-day average effluent quality achieved by a treatment works in a period of at least two years, excluding values attributable to upsets, bypasses, operational errors, or other unusual conditions, and (2) a 7-day average value equal to 1.5 times the value derived under paragraph (f)(1) of this section.

(g) *"Facilities eligible for treatment equivalent to secondary treatment."* Treatment works shall be eligible for consideration for effluent limitations described for treatment equivalent to secondary treatment (§ 133.105), if:

(1) The BOD_5 and SS effluent concentrations consistently achievable through proper operation and maintenance (§ 133.101(f)) of the treatment works exceed the minimum level of the effluent quality set forth in §§ 133.102(a) and 133.102(b),

(2) A trickling filter or waste stabilization pond is used as the principal process, and

(3) The treatment works provide significant biological treatment of municipal wastewater.

(h) *"mg/l."* Milligrams per liter.

(i) *"NPDES."* National Pollutant Discharge Elimination System.

(j) *"Percent removal."* A percentage expression of the removal efficiency across a treatment plant for a given pollutant parameter, as determined from the 30-day average values of the raw wastewater influent pollutant concentrations to the facility and the 30-day average values of the effluent pollutant concentrations for a given time period.

(k) *"Significant biological treatment."* The use of an aerobic or anaerobic biological treatment process in a treatment works to consistently achieve a 30-day average of a least 65 percent removal of BOD_5.

(l) *"SS."* The pollutant parameter total suspended solids.

(m) *"Significantly more stringent limitation"* means BOD_5 and SS limitations necessary to meet the percent removal requirements of at least 5 mg/l more stringent than the otherwise applicable concentration-based limitations (e.g., less than 25 mg/l in the case of the secondary treatment limits for BOD_5 and SS), or the percent removal limitations in §§ 133.102 and 133.105, if such limits would, by themselves, force significant construction or other significant capital expenditure.

(n) *"State Director"* means the chief administrative officer of any State or interstate agency operating an "approved program," or the delegated representative of the State Director.

[49 FR 37006, Sept. 20, 1984; 49 FR 40405, Oct. 16, 1984, as amended at 50 FR 23387, June 3, 1985]

§ 133.102 Secondary treatment.

The following paragraphs describe the minimum level of effluent quality attainable by secondary treatment in terms of the parameters—BOD$_5$, SS and pH. All requirements for each parameter shall be achieved except as provided for in §§ 133.103 and 133.105.

(a) *BOD$_5$*.

(1) The 30-day average shall not exceed 30 mg/l.

(2) The 7-day average shall not exceed 45 mg/l.

(3) The 30-day average percent removal shall not be less than 85 percent.

(4) At the option of the NPDES permitting authority, in lieu of the parameter BOD$_5$ and the levels of the effluent quality specified in paragraphs (a)(1), (a)(2) and (a)(3), the parameter CBOD$_5$ may be substituted with the following levels of the CBOD$_5$ effluent quality provided:

(i) The 30-day average shall not exceed 25 mg/l.

(ii) The 7-day average shall not exceed 40 mg/l.

(iii) The 30-day average percent removal shall not be less than 85 percent.

(b) *SS.* (1) The 30-day average shall not exceed 30 mg/l.

(2) The 7-day average shall not exceed 45 mg/l.

(3) The 30-day average percent removal shall not be less than 85 percent.

(c) *pH.* The effluent values for pH shall be maintained within the limits of 6.0 to 9.0 unless the publicly owned treatment works demonstrates that: (1) Inorganic chemicals are not added to the waste stream as part of the treatment process; and (2) contributions from industrial sources do not cause the pH of the effluent to be less than 6.0 or greater than 9.0.

[49 FR 37006, Sept. 20, 1984; 49 FR 40405, Oct. 16, 1984]

§ 133.103 Special considerations.

(a) *Combined sewers.* Treatment works subject to this part may not be capable of meeting the percentage removal requirements established under §§ 133.102(a)(3) and 133.102(b)(3), or §§ 133.105(a)(3) and 133.105(b)(3) during wet weather where the treatment works receive flows from combined sewers (*i.e.*, sewers which are designed to transport both storm water and sanitary sewage). For such treatment works, the decision must be made on a case-by-case basis as to whether any attainable percentage removal level can be defined, and if so, what the level should be.

(b) *Industrial wastes.* For certain industrial categories, the discharge to navigable waters of BOD$_5$ and SS permitted under sections 301(b)(1)(A)(i), (b)(2)(E) or 306 of the Act may be less stringent than the values given in §§ 133.102(a)(1), 133.102(a)(4)(i), 133.102(b)(1), 133.105(a)(1), 133.105(b)(1) and 133.105(e)(1)(i). In cases when wastes would be introduced from such an industrial category into a publicly owned treatment works, the values for BOD$_5$ and SS in §§ 133.102(a)(1), 133.102(a)(4)(i), 133.102(b)(1), 133.105(a)(1), 133.105(b)(1), and 133.105(e)(1)(i) may be adjusted upwards provided that: (1) The permitted discharge of such pollutants, attributable to the industrial category, would not be greater than that which would be permitted under sections 301(b)(1)(A)(i), 301(b)(2)(E) or 306 of the Act if such industrial category were to discharge directly into the navigable waters, and (2) the flow or loading of such pollutants introduced by the industrial category exceeds 10 percent of the design flow or loading of the publicly owned treatment works. When such an adjustment is made, the values for BOD$_5$ or SS in §§ 133.102(a)(2), 133.102(a)(4)(ii), § 133.102(b)(2), 133.105(a)(2), 133.105(b)(2), and 133.105(e)(1)(ii) should be adjusted proportionately.

(c) *Waste stabilization ponds.* The Regional Administrator, or, if appropriate, State Director subject to EPA approval, is authorized to adjust the minimum levels of effluent quality set forth in § 133.105 (b)(1), (b)(2), and (b)(3) for treatment works subject to this part, to conform to the SS concentrations achievable with waste stabilization ponds, provided that: (1) Waste stablization ponds are the principal process used for secondary treatment; and (2) operation and maintenance data indicate that the SS values specified in § 133.105 (b)(1), (b)(2), and (b)(3) cannot be achieved. The term "SS concentrations achievable with waste stabilization ponds" means a SS value, determined by the Regional Administrator, or, if appropriate, State Director subject to EPA approval, which is equal to the effluent concentration achieved 90 percent of the time within a State or appropriate contiguous geographical area by waste stabilization ponds that are achieving the levels of effluent quality for BOD_5 specified in § 133.105(a)(1). [cf. 43 FR 55279].

(d) *Less concentrated influent wastewater for separate sewers.* The Regional Administrator or, if appropriate, State Director is authorized to substitute either a lower percent removal requirement or a mass loading limit for the percent removal requirements set forth in §§ 133.102(a)(3), 133.102(a)(4)(iii), 133.102(b)(3), 102.105(a)(3), 133.105(b)(3) and 133.105(e)(1)(iii) provided that the permittee satisfactorily demonstrates that: (1) The treatment works is consistently meeting, or will consistently meet, its permit effluent concentration limits but its percent removal requirements cannot be met due to less concentrated influent wastewater, (2) to meet the percent removal requirements, the treatment works would have to achieve significantly more stringent limitations than would otherwise be required by the concentration-based standards, and (3) the less concentrated influent wastewater is not the result of excessive I/I. The determination of whether the less concentrated wastewater is the result of excessive I/I will use the definition of excessive I/I in 40 CFR 35.2005(b)(16) plus the additional criterion that inflow is nonexcessive if the total flow to the POTW (i.e., wastewater plus inflow plus infiltration) is less than 275 gallons per capita per day.

(e) Less concentrated influent wastewater for combined sewers during dry weather. The Regional Administrator or, if appropriate, the State Director is authorized to substitute either a lower percent removal requirement or a mass loading limit for the percent removal requirements set forth in §§ 133.102(a)(3), 133.102(a)(4)(iii), 133.102(b)(3), 133.105(a)(3), 133.105(b)(3) and 133.105(e)(1)(iii) provided that the permittee satisfactorily demonstrates that: (1) The treatment works is consistently meeting, or will consistently meet, its permit effluent concentration limits, but the percent removal requirements cannot be met due to less concentrated influent wastewater; (2) to meet the percent removal requirements, the treatment works would have to achieve significantly more stringent effluent concentrations than would otherwise be required by the concentration-based standards; and (3) the less concentrated influent wastewater does not result from either excessive infiltration or clear water industrial discharges during dry weather periods. The determination of whether the less concentrated wastewater results from excessive infiltration is discussed in 40 CFR 35.2005(b)(28), plus the additional criterion that either 40 gallons per capita per day (gpcd) or 1500 gallons per inch diameter per mile of sewer (gpdim) may be used as the threshold value for that portion of the dry weather base flow attributed to infiltration. If the less concentrated influent wastewater is the result of clear water industrial discharges, then the treatment works must control such discharges pursuant to 40 CFR Part 403.

[49 FR 37006, Sept. 20, 1984, as amended at 50 FR 23387, June 3, 1985; 50 FR 36880, Sept. 10, 1985; 54 FR 4228, Jan. 27, 1989]

§ 133.104 Sampling and test procedures.

(a) Sampling and test procedures for pollutants listed in this part shall be in accordance with guidelines promulgated by the Administrator in 40 CFR Part 136.

(b) Chemical oxygen demand (COD) or total organic carbon (TOC) may be substituted for BOD$_5$ when a long-term BOD:COD or BOD:TOC correlation has been demonstrated.

§ 133.105 Treatment equivalent to secondary treatment.

This section describes the minimum level of effluent quality attainable by facilities eligible for treatment equivalent to secondary treatment (§ 133.101(g)) in terms of the parameters—BOD$_5$, SS and pH. All requirements for the specified parameters in paragraphs (a), (b) and (c) of this section shall be achieved except as provided for in § 133.103, or paragraphs (d), (e) or (f) of this section.

(a) *BOD$_5$*. (1) The 30-day average shall not exceed 45 mg/l.

(2) The 7-day average shall not exceed 65 mg/l.

(3) The 30-day average percent removal shall not be less than 65 percent.

(b) *SS.* Except where SS values have been adjusted in accordance with § 133.103(c):

(1) The 30-day average shall not exceed 45 mg/l.

(2) The 7-day average shall not exceed 65 mg/l.

(3) The 30-day average percent removal shall not be less than 65 percent.

(c) *pH.* The requirements of § 133.102(c) shall be met.

(d) *Alternative State requirements.* Except as limited by paragraph (f) of this section, and after notice and opportunity for public comment, the Regional Administrator, or, if appropriate, State Director subject to EPA approval, is authorized to adjust the minimum levels of effluent quality set forth in paragraphs (a)(1), (a)(2), (b)(1) and (b)(2) of this section for trickling filter facilities and in paragraphs (a)(1) and (a)(2) of this section for waste stabilization pond facilities, to conform to the BOD$_5$ and SS effluent concentrations consistently achievable through proper operation and maintenance (§ 133.101(f)) by the median (50th percentile) facility in a representative sample of facilities within a State or appropriate contiguous geographical area that meet the definition of facilities eligible for treatment equivalent to secondary treatment (§ 133.101(g)).

(The information collection requirements contained in this rule have been approved by OMB and assigned control number 2040-0051.)

(e) *CBOD$_5$* limitations:

(1) Where data are available to establish CBOD$_5$ limitations for a treatment works subject to this section, the NPDES permitting authority may substitute the parameter CBOD$_5$ for the parameter BOD$_5$ In §§ 133.105(a)(1), 133.105(a)(2) and 133.105(a)(3), on a case-by-case basis provided that the levels of CBOD$_5$ effluent quality are not less stringent than the following:

(i) The 30-day average shall not exceed 40 mg/l.

(ii) The 7-days average shall not exceed 60 mg/l.

(iii) The 30-day average percent removal shall not be less than 65 percent.

(2) Where data are available, the parameter CBOD$_5$ may be used for effluent quality limitations established under paragraph (d) of this section. Where concurrent BOD effluent data are available, they must be submitted with the CBOD data as a part of the approval process outlined in paragraph (d) of this section.

(f) *Permit adjustments.* Any permit adjustment made pursuant to this part may not be any less stringent than the limitations required pursuant to § 133.105(a)–(e). Furthermore, permitting authorities shall require more stringent limitations when adjusting permits if: (1) For existing facilities the permitting authority determines that the 30-day average and 7-day average BOD$_5$ and SS effluent values that could be achievable through proper operation and maintenance of the treatment works, based on an analysis of the past performance of the treatment works, would enable the treatment works to achieve more stringent limitations, or

(2) For new facilities, the permitting authority determines that the 30-day average and 7-day average BOD$_5$ and SS effluent values that could be achievable through proper operation and maintenance of the treatment

works, considering the design capability of the treatment process and geographical and climatic conditions, would enable the treatment works to achieve more stringent limitations.

[49 FR 37006, Sept. 20, 1984; 49 FR 40405, Oct. 16, 1984]

PART 135—PRIOR NOTICE OF CITIZEN SUITS

Subpart A—Prior Notice Under the Clean Water Act

Sec.
135.1 Purpose.
135.2 Service of notice.
135.3 Contents of notice.

Subpart B—Prior Notice Under the Safe Drinking Water Act

135.10 Purpose.
135.11 Service of notice.
135.12 Contents of notice.
135.13 Timing of notice.

AUTHORITY: Subpart A, issued under Sec. 505, Clean Water Act (33 U.S.C. 1365); Subpart B, issued under Sec. 1449, Safe Drinking Water Act (42 U.S.C. 300j–8).

SOURCE: 38 FR 15040, June 7, 1973, unless otherwise noted.

Subpart A—Prior Notice Under the Clean Water Act

§ 135.1 Purpose.

Section 505 of the Federal Water Pollution Control Act Amendments of 1972 (hereinafter the Act) authorizes any person or persons having an interest which is or may be adversely affected to commence a civil action on his own behalf to enforce the Act or to enforce certain requirements promulgated pursuant to the Act. The purpose of this subpart is to prescribe procedures governing the giving of notice required by section 505(b) of the Act as a prerequisite to the commencement of such actions.

§ 135.2 Service of notice.

(a) Notice of intent to file suit pursuant to section 505(a)(1) of the Act shall be served upon an alleged violator of an effluent standard or limitation under the Act, or an order issued by the Administrator or a State with respect to such a standard or limitation, in the following manner:

(1) If the alleged violator is an individual or corporation, service of notice shall be accomplished by certified mail addressed to, or by personal service upon, the owner or managing agent of the building, plant, installation, vessel, facility, or activity alleged to be in violation. A copy of the notice shall be mailed to the Administrator of the Environmental Protection Agency, the Regional Administrator of the Environmental Protection Agency for the region in which such violation is alleged to have occurred, and the chief administrative officer of the water pollution control agency for the State in which the violation is alleged to have occurred. If the alleged violator is a corporation, a copy of such notice also shall be mailed to the registered agent, if any, of such corporation in the State in which such violation is alleged to have occurred.

(2) If the alleged violator is a State or local agency, service of notice shall be accomplished by certified mail addressed to, or by personal service upon, the head of such agency. A copy of such notice shall be mailed to the chief administrative officer of the water pollution control agency for the State in which the violation is alleged to have occurred, the Administrator of the Environmental Protection Agency, and the Regional Administrator of the Environmental Protection Agency for the region in which such violation is alleged to have occurred.

(3) If the alleged violator is a Federal agency, service of notice shall be accomplished by certified mail addressed to, or by personal service upon, the head of such agency. A copy of such notice shall be mailed to the Administrator of the Environmental Protection Agency, the Regional Administrator of the Environmental Protection Agency for the region in which such violation is alleged to have occurred, the Attorney General of the United States, and the Chief administrative officer of the water pollution control agency for the State in which the violation is alleged to have occurred.

(b) Service of notice of intent to file suit pursuant to section 505(a)(2) of the Act shall be accomplished by certified mail addressed to, or by personal service upon, the Administrator, Environmental Protection Agency, Washington, DC, 20460. A copy of such notice shall be mailed to the Attorney General of the United States.

(c) Notice given in accordance with the provisions of this subpart shall be deemed to have been served on the postmark date if mailed, or on the date of receipt if served personally.

§ 135.3 Contents of notice.

(a) *Violation of standard, limitation or order.* Notice regarding an alleged violation of an effluent standard or limitation or of an order with respect thereto, shall include sufficient information to permit the recipient to identify the specific standard, limitation, or order alleged to have been violated, the activity alleged to constitute a violation, the person or persons responsible for the alleged violation, the location of the alleged violation, the date or dates of such violation, and the full name, address, and telephone number of the person giving notice.

(b) *Failure to act.* Notice regarding an alleged failure of the Administrator to perform any act or duty under the Act which is not discretionary with the Administrator shall identify the provision of the Act which requires such act or creates such duty, shall describe with reasonable specificity the action taken or not taken by the Administrator which is alleged to constitute a failure to perform such act or duty, and shall state the full name, address and telephone number of the person giving the notice.

(c) *Identification of counsel.* The notice shall state the name, address, and telephone number of the legal counsel, if any, representing the person giving the notice.

Subpart B—Prior Notice Under the Safe Drinking Water Act

SOURCE: 54 FR 20771, May 12, 1989, unless otherwise noted.

§ 135.10 Purpose.

Section 1449 of the Safe Drinking Water Act (the Act) authorizes any person to commence a civil action to enforce the Act against an alleged violator of any requirements prescribed by or under the Act, or against the Administrator for failure to perform any duty which is not discretionary under the Act. No citizen suit may be commenced prior to sixty days after giving notice of the alleged violation to the Administrator, any alleged violator, and to the State. The purpose of this subpart is to prescribe procedures for giving the notice required by section 1449(b).

§ 135.11 Service of notice.

(a) Notice of intent to file suit pursuant to section 1449(a)(1) of the Act shall be served in the following manner upon an alleged violator of any requirement prescribed by or under the Act:

(1) If the alleged violator is an individual or corporation, service of notice shall be accomplished by certified mail, return receipt requested, addressed to, or by personal service upon, such individual or corporation. If a public water system or underground injection well is alleged to be in violation, service shall be upon the owner or operator. A copy of the notice shall be sent by certified mail, return receipt requested, to the Administrator of the Environmental Protection Agency, the Regional Administrator of the Environmental Protection Agency for the region in which such violation is alleged to have occurred, the chief administrative officer of the responsible state agency (if any), and the Attorney General for the State in which the violation is alleged to have occurred. If the alleged violator is a corporation, a copy of the notice shall also be sent by certified mail, return receipt requested, to the registered agent (if any) of the corporation in the State in which the violation is alleged to have occurred.

(2) If the alleged violator is a State or local agency, service of notice shall be accomplished by certified mail, return receipt requested, addressed to, or by personal service upon, the head of such agency. A copy of the notice shall be sent by certified mail, return receipt requested, to the Administrator of the Environmental Protection

Agency, the Regional Administrator of the Environmental Protection Agency for the region in which the violation is alleged to have occurred, the chief administrative officer of the responsible state agency (if any), and the Attorney General for the State in which the violation is alleged to have occurred.

(3) If the alleged violator is a Federal agency, service of notice shall be accomplished by certified mail, return receipt requested, addressed to, or by personal service upon, the head of the Federal agency. A copy of the notice shall be sent by certified mail, return receipt requested, to the Administrator of the Environmental Protection Agency, the Regional Administrator of the Environmental Protection Agency for the region in which the violation is alleged to have occurred, the Attorney General of the United States, the chief administrative officer of the re-sponsible state agency (if any), and he Attorney General for the State in vhich the violation is alleged to have ccurred.

(b) Service of notice of intent to file uit pursuant to section 1449(a)(2) of he Act shall be accomplished by certi-ied mail, return receipt requested, ad-ressed to, or by personal service pon, the Administrator of the Envi-onmental Protection Agency, Wash-ngton, DC 20460. A copy of the notice hall be sent by certified mail to the ttorney General of the United tates.

(c) Notice given in accordance with e provisions of this subpart shall be eemed to have been given on the date f receipt of service, if served person-ly. If service was accomplished by ail, the date of receipt will be consid-ed to be the date noted on the turn receipt card.

135.12 Contents of notice.

(a) *Violation of standard or require-ent.* Notice regarding an alleged vio-tion of any requirement prescribed or under the Act shall include suffi-ent information to permit the recipi-t to identify the specific require-ent alleged to have been violated, e activity alleged to constitute a vio-ion, the person or persons responsi-e for the alleged violation, the loca-n of the alleged violation, the date or dates of the alleged violation, and the full name, address, and telephone number of the person giving notice.

(b) *Failure to act.* Notice regarding an alleged failure of the Administrator to perform any act or duty under the Act which is not discretionary with the Administrator shall identify the provision of the Act which requires the act or creates the duty, and shall describe with reasonable specificity the action taken or not taken by the Administrator which is alleged to constitute a failure to perform such act or duty, and shall state the full name, address, and telephone number of the person giving notice.

(c) *Identification of counsel.* All notices shall include the name, address, and telephone number of the legal counsel, if any, representing the person giving notice.

§ 135.13 Timing of notice.

No action may be commenced under section 1449(a)(1) or (a)(2) until the plaintiff has given each of the appropriate parties sixty days notice of intent to file such an action. Actions concerning injection wells disposing of hazardous waste which allege jurisdiction solely under section 7002(c) of the Resource Conservation and Recovery Act may proceed immediately after notice to the appropriate parties.

PART 136—GUIDELINES ESTABLISHING TEST PROCEDURES FOR THE ANALYSIS OF POLLUTANTS

Sec.

136.1 Applicability.
136.2 Definitions.
136.3 Identification of test procedures.
136.4 Application for alternate test procedures.
136.5 Approval of alternate test procedures.

APPENDIX A TO PART 136—METHODS FOR ORGANIC CHEMICAL ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER

APPENDIX B TO PART 136—DEFINITION AND PROCEDURE FOR THE DETERMINATION OF THE METHOD DETECTION LIMIT—REVISION 1.11

Sec.

APPENDIX C TO PART 136—INDUCTIVELY COUPLED PLASMA—ATOMIC EMISSION SPECTROMETRIC METHOD FOR TRACE ELEMENT ANALYSIS OF WATER AND WASTES METHOD 200.7

AUTHORITY: Secs. 301, 304(h), 307 and 501(a), Pub. L. 95-217, 91 Stat. 1566, et seq. (33 U.S.C. 1251, et seq.) (the Federal Water Pollution Control Act Amendments of 1972 as amended by the Clean Water Act of 1977).

§ 136.1 Applicability.

The procedures prescribed herein shall, except as noted in § 136.5, be used to perform the measurements indicated whenever the waste constituent specified is required to be measured for:

(a) An application submitted to the Administrator, or to a State having an approved NPDES program for a permit under section 402 of the Clean Water Act of 1977, as amended (CWA), and/or to reports required to be submitted under NPDES permits or other requests for quantitative or qualitative effluent data under Parts 122 to 125 of Title 40, and,

(b) Reports required to be submitted by discharges under the NPDES established by Parts 124 and 125 of this chapter, and,

(c) Certifications issued by States pursuant to section 401 of the CWA, as amended.

[38 FR 28758, Oct. 16, 1973, as amended at 49 FR 43250, Oct. 26, 1984]

§ 136.2 Definitions.

As used in this part, the term:

(a) "Act" means the Clean Water Act of 1977, Pub. L. 95-217, 91 Stat. 1566, et seq. (33 U.S.C. 1251 et seq.) (The Federal Water Pollution Control Act Amendments of 1972 as amended by the Clean Water Act of 1977).

(b) "Administrator" means the Administrator of the U.S. Environmental Protection Agency.

(c) "Regional Administrator" means one of the EPA Regional Administrators.

(d) "Director" means the Director of the State Agency authorized to carry out an approved National Pollutant Discharge Elimination System Program under section 402 of the Act.

(e) "National Pollutant Dischar Elimination System (NPDES)" mea the national system for the issuance permits under section 402 of the A and includes any State or intersta program which has been approved b the Administrator, in whole or in par pursuant to section 402 of the Act.

(f) "Detection limit" means the mi imum concentration of an analyt (substance) that can be measured an reported with a 99% confidence tha the analyte concentration is greate than zero as determined by the proc dure set forth at Appendix B of thi part.

[38 FR 28758, Oct. 16, 1973, as amended 49 FR 43250, Oct. 26, 1984]

§ 136.3 Identification of test procedures.

(a) Parameters or pollutants, fo which methods are approved, ar listed together with test procedure descriptions and references in Tables IA, IB, IC, ID, and IE. The full text of the referenced test procedures are incorporated by reference into Tables IA, IB, IC, ID, and IE. The references and the sources from which they are available are given in paragraph (b) of this section. These test procedures are incorporated as they exist on the day of approval and a notice of any change in these test procedures will be published in the FEDERAL REGISTER. The discharge parameter values for which reports are required must be determined by one of the standard analytical test procedures incorporated by reference and described in Tables IA, IB, IC, ID, and IE, or by any alternate test procedure which has been approved by the Administrator under the provisions of paragraph (d) of this section and §§ 136.4 and 136.5 of this Part 136 Under certain circumstances (§ 136.3 (b) or (c) or 40 CFR 401.13) other test procedures may be used that may be more advantageous when such other test procedures have been previously approved by the Regional Administrator of the Region in which the discharge will occur, and providing the Director of the State in which such discharge will occur does not object to the use of such alternate test procedure.

TABLE IA—LIST OF APPROVED BIOLOGICAL TEST PROCEDURES

Parameter and units	Method [1]	EPA [2]	Reference (Method Number or Page)		
			Standard Methods 15th Ed.	ASTM	USGS
Bacteria:					
1. Coliform (fecal) number per 100 ml.	MPN, 5 tube, 3 dilution; or, membrane filter (MF)[4], single step.	Page 132.	908C		
2. Coliform (fecal) in presence of chlorine number per 100 ml.	MPN, 5 tube, 3 dilution; or, MF [4], single step. [6].	p. 124	909		B-0050-77.
3. Coliform (total, number per 100 ml.	MPN, 5 tube, 3 dilution; or, MF [4] single step or two step.	p. 114	908A		
4. Coliform (total) in presence of chlorine, number per 100 ml.	MPN, 5 tube, dilution; or MF [4] with enrichment.	p. 108 p. 114	909A 908A		B-0025-77.
5. Fecal streptococci, number per 100 ml.	MPN, 5 tube, 3 dilution; MF [4]; or, plate count.	p. 111 p. 139	909 (A+A.5c) 910A		
	p. 136 p. 143		910B 910C		B0055-77.[5]

Table IA Notes

[1] The method used must be specified when results are reported.

[2] "Microbiological Methods for Monitoring the Environment, Water and Waste, 1978", EPA-600/8-78-017, U.S. Environmental Protection Agency.

[3] Greeson, P.E., *et al.*, "Methods for Collection and Analysis of Aquatic Biological and Microbiological Samples, "U.S. Geological Survey, Techniques of Water-Resources Investigations, Book 5, Chapter A4, Laboratory Analysis, 1977.

[4] 0.45 μm membrane filter or other pore size certified by the manufacturer to fully retain organisms to be cultivated, and free of extractables which could interfere with their growth and development.

[6] Since the membrane filter technique usually yields low and variable recovery from chlorinated wastewaters, the MPN method will be required to resolve any controversies.

[5] Approved only if dissolution of the KF Streptococcus Agar (Section 5.1, USGS Method 8-0055-77) is made in a boiling water bath to avoid scorching of the medium.

TABLE IB—LIST OF APPROVED INORGANIC TEST PROCEDURES

Parameter, units, and method	Reference (method No. or page)				
	EPA 1979	Standard methods 16th Ed.	ASTM	USGS [1]	Other
1. Acidity, as $CaCO_3$ mg/L: Electrometric end point or phenolphthalein end point.	305.1	402(4.a)	1067-82(E)		
2. Alkalinity, as $CaCO_3$ mg/L:					
Electrometric or colorimetric titration to pH 4.5, manual, or.	310.1	403	D1067-82(B)	I-1030-84	33.014[2].
Automated	310.2			I-2030-84	
3. Aluminum—Total,[3] mg/L; Digestion [3] followed by:					
AA direct aspiration	202.1	303C		I-3051-85	
AA furnace	202.2	304			
Inductively coupled plasma (ICP)					
Direct current plasma (DCP) or					200.7.[4]
Colorimetric (Eriochrome cyanine R)		306B			Note 33.
4. Ammonia (as N), mg/L: Manual distillation (at pH 9.5) [5] followed by:	350.2	417A			33.057.[2]
Nesslerization	350.2	417B	D1426-79(A)	I-3520-84	33.057.[2]
Titration	350.2	417D			
Electrode	350.3	417 E or F	D1426-79(D)		
Automated phenate or	350.1	417G	D1426-79(C)	I-4523-84	
Automated electrode					Note 6.
5. Antimony—Total [3], mg/L: Digestion [3] followed by:					
AA direct aspiration	204.1	303A			
AA furnace, or	204.2	304			
Inductively coupled plasma					200.7.[4]
6. Arsenic—Total [3], mg/L: Digestion [3] followed by	206.5				
AA gaseous hydride	206.3	303E	D2972-84(B)	I-3062-84	

TABLE IB—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter, units, and method	Reference (method No. or page)				
	EPA 1979	Standard methods 16th Ed.	ASTM	USGS [1]	Other
AA furnace	206.2	304			
Inductively coupled plasma, or					200.7.[4]
Colorimetric (SDDC)	206.4	307B	D2972-84(A)	I-3060-84	
7. Barium—Total,[3] mg/L; Digestion [3] followed by:					
AA direct aspiration	208.1	303C		I-3084-85	
AA furnace	208.2	304			
ICP, or					200.7.[4]
DCP					Note 33.
8. Beryllium—Total,[3] mg/L; Digestion [3] followed by:					
AA direct aspiration	210.1	303C	D3645-84(A)	I-3095-85	
AA furnace	210.2	304			
ICP					200.7.[4]
DCP, or					Note 33.
Colorimetric (aluminon)		309B			
9. Biochemical oxygen demand (BOD_5), mg/L:					
Dissolved Oxygen Depletion	405.1	507		I-1578-78 [7]	33.018 [8], p. 17.[9]
10. Boron—Total, mg/L;					
Colorimetric (curcumin)	212.3	404A		I-3112-85	
ICP, or					200.7.[4]
DCP					Note 33.
11. Bromide, mg/L: Titrimetric	320.1		D1246-82(C)	I-1125-84	p. S44.[9]
12. Cadmium—Total,[3] mg/L; Digestion [3] followed by:					
AA direct aspiration	213.1	303 A or B	D3557-84 (A or B).	I-3135-85 or I-3136-85.	33.089.[8] p. 37.[9]
AA furnace	213.2	304			
ICP					200.7.[4]
DCP					Note 33
Voltametry,[10] or			D3557-84(C)		
Colorimetric (Dithizone)		310B			
13. Calcium—Total,[3] mg/L; Digestion [3] followed by:					
AA direct aspiration	215.1	303A	D511-84(B)	I-3152-85	
ICP					200.7.[4]
DCP, or					Note 33.
Titrimetric (EDTA)	215.2	311C	D511-84(A)		
14. Carbonaceous biochemical oxygen demand ($CBOD_5$), mg/L [11]: Dissolved Oxygen Depletion with nitrification inhibitor.		507(5.e.6)			
15. Chemical oxygen demand (COD), mg/L:					
Titrimetric, or	410.1, 410.2, or 410.3	508A	D1252-83	I-3560-84 or I-3562-84.	33.034 [8], p. 17.[9]
Spectrophotometric, manual or automated.	410.4			I-3561-84	Notes 12 or 13.
16. Chloride, mg/L:					
Titrimetric (silver nitrate)		407A	D512-81(B)	I-1183-84	
or (Mercuric nitrate), or	325.3	407B	D512-81(A)	I-1184-84	33.067.[8]
Colorimetric, manual or			D512-81(C)	I-1187-84	
Automated (Ferricyanide)	325.1, or 325.2	407D		I-2187-84	
17. Chlorine—Total residual, mg/L:					
Titrimetric:					
Amperometric direct	330.1	408C	D1253-76(A)		
Starch end point direct	330.3	408A	D1253-76(B) Part 18.3		
Back titration either end point [14], or.	330.2	408B			
DPD-FAS	330.4	408D			
Spectrophotometric, DPD	330.5	408E			
Or Electrode					Note 15.

TABLE IB—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter, units, and method	Reference (method No. or page)				
	EPA 1979	Standard methods 16th Ed.	ASTM	USGS [1]	Other
8. Chromium VI dissolved, mg/L: 0.45 micron filtration followed by:					
AA chelation-extraction, or	218.4	303B		I-1232-84	
Colorimetric (Diphenylcarbazide)				I-1230-84	307B.[18]
9. Chromium—Total,[3] mg/L; Digestion [3] followed by:					
AA direct aspiration	218.1	303A	D1667-84(D)	I-3236-85	33.089.[2]
AA chelation-extraction	218.3	303B			
AA furnace	218.2	304			
ICP					200.7.[4]
DCP, or					Note 33.
Colorimetric (Diphenylcarbazide)		312B	D1687-84(A)		
0. Cobalt—Total,[3] mg/L; Digestion [3] followed by:					
AA direct aspiration	219.1	303 A or B	D3558-84 (A or B).	I-3239-85 or I-3240-85b.	p. 37.[9]
AA furnace	219.2	304			
ICP, or					200.7.[4]
DCP					Note 33.
. Color platinum cobalt units or dominant wavelength, hue, luminance purity:					
Colorimetric (ADMI), or	110.1	204D			Note 17.
(Platinum cobalt), or	110.2	204A		I-1250-84	
Spectrophotometric	110.3	204B			
. Copper—Total,[3] mg/L; Digestion [3] followed by:					
AA direct aspiration	220.1	303 A or B	D1688-84 (D or E).	I-3270-85 or I-3271-85.	33.089.[2] p. 37.[9]
AA furnace	220.2	304			
ICP					200.7.[4]
DCP, or					Note 33.
Colorimetric (Neocuproine), or (Bicinchoninate).		313B	D1688-84(A)		Note 18.
Cyanide—Total, mg.L: Manual distil- ation with $MgCl_2$ followed by		412B			
Titrimetric, or		412C			p. 22.[9]
Spectrophotometric, manual or	335.2	412D	D2036-82(A)	I-3300-84	
Automated.[19]	335.3		D2036-82(A)		
Cyanide amendable to chlorination, ng/L: Manual distillation with $MgCl_2$ ollowed by titrimetric or spectrophotometric.	335.1	412F	D2036-82(B)		
Fluoride—Total, mg/L: Manual distil- ation[6] followed by:		413A			
Electrode, manual or	340.2	413B	D1179-80(B)		
Automated,				I-4327-84	
Colorimetric (SPADNS),	340.1	413C	D1179-80(A)		
Or Automated complexone	340.3	413E			
Gold—Total,[3] mg/L; Digestion [3] fol- owed by:					
AA direct aspiration	231.2	303A			
AA furnace, or	231.2	304			
DCP					Note 33.
Hardness—Total, as $CaCO_3$ mg/L:					
Automated colorimetric,	130.1				
Titrimetric (EDTA), or Ca plus Mg as their carbonates, by inductively coupled plasma or AA direct aspiration. (See Parameters 13 and 33.).	130.2	314B	D1126-80	I-1338-84	33.082.[2]
Hydrogen ion (pH), pH units:					
Electrometric, measurement, or	150.1	423	D1293-84 (A or B).	I-1586-84	33.006.[2]
Automated electrode					Note 20.

TABLE IB—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter, units, and method	Reference (method No. or page)				
	EPA 1979	Standard methods 16th Ed.	ASTM	USGS[1]	Other
29. Iridium—Total[3], mg/L; Digestion[3] followed by:					
AA direct aspiration, or	235.1	303A			
AA furnace	235.2	304			
30. Iron—Total,[3] mg/L; Digestion[3] followed by:					
AA direct aspiration	236.1	303 A or B	D1068-84 (C or D).	I-3381-85	33.089.[2]
AA furnace	236.2	304			
ICP					200.7.[4]
DCP, or					Note 33.
Colorimetric (Phenanthroline)		315B	D1068-84(A)		Note 21.
31. Kjeldahl nitrogen—Total, (as N), mg/L: Digestion and distillation followed by:	351.3	420 A or B	D3590-84(A)		
Titration	351.3	417D	D3590-84(A)		33.051.[2]
Nesslerization	351.3	417B	D3590-84(A)		
Electrode	351.3	417 E or F			
Automated phenate	351.1			I-4551-78[7]	
Semi-automated block digestor, or	351.2		D3590-84(A)		
Potentiometric	351.4		D3590-84(A)		
32. Lead—Total,[3] mg/L; Digestion[3] followed by:					
AA direct aspiration	239.1	303 A or B	D3559-84 (A or B).	I-3399-85	33.089.[2]
AA furnace	239.2	304			
ICP					200.7.[4]
DCP					Note 33.
Voltametry,[10] or			D3559-85(C)		
Colorimetric (Dithizone)		316B			
33. Magnesium—Total,[3] mg/L; Digestion[3] followed by:					
AA direct aspiration	242.1	303A	D511-84(B)	I-3447-85	33.089.[2]
ICP					200.7.[4]
DCP, or					Note 33.
Gravimetric		318B	D511-77(A)		
34. Manganese—Total,[3] mg/L; Digestion[3] followed by:					
AA direct aspiration	243.1	304 A or B	D858-84 (B or C).	I-3454-85	33.089.[2]
AA furnace	243.2	304			
ICP					200.7.[4]
DCP, or					Note 33.
Colorimetric (Persulfate) or		319B	D858-84(A)		33.126.[2]
(Periodate)					Note 22.
35. Mercury—Total[3], mg/L:					
Cold vapor, manual or	245.1	303F	D3223-80	I-3462-84	33.095.[2]
Automated	245.2				
36. Molybdenum—Total,[3] mg/L; Digestion[3] followed by:					
AA direct aspiration	246.1	303C		I-3490-85	
AA furnace	246.2	304			
ICP, or					200.7.[4]
DCP					Note 33.
37. Nickel—Total,[3] mg/L; Digestion[3] followed by:					
AA direct aspiration	249.1	303 A or B	D1886-84 (C or D).	I-3499-85	
AA furnace	249.2	304			
ICP					200.7.[4]
DCP, or					Note 33.
Colorimetric (Heptoxime)		321B			

TABLE IB—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter, units, and method	Reference (method No. or page)				
	EPA 1979	Standard methods 16th Ed.	ASTM	USGS [1]	Other
38. Nitrate (as N), mg/L: Colorimetric (Brucine sulfate), or Nitrate-nitrite N minus Nitrite N (See parameters 39 and 40).	352.1		D992-71		33.063 [2], 419D [16], p. 28.[9]
39. Nitrate-nitrite (as N), mg/L: Cadmium reduction, Manual or	353.3	418C	D3867-85(B)		
Automated, or	353.2	418F	D3867-85(A)	I-4545-84	
Automated hydrazine	353.1				
40. Nitrite (as N), mg/L: Spectrophotometric:					
Manual or	354.1	419	D1254-67		Note 24.
Automated (Diazotization)				I-4540-84	
41. Oil and grease—Total recoverable, mg/L: Gravimetric (extraction).	413.1	503A			
42. Organic carbon—Total (TOC), mg/L: Combustion or oxidation.	415.1	505	D2579.85 (A or B).		33.044 [2], p. 4.[22]
43. Organic nitrogen (as N) mg/L: Total Kjeldahl N (Parameter 31) minus ammonia N (Parameter 4.).					
44. Orthophosphate (as P), mg/L: Ascorbic acid method:					
Automated or	365.1	424G		I-4601-84	33.116. [2]
Manual single reagent	365.2	424F	D515-82(A)		33.111. [2]
or Manual two reagent	365.3				
45. Osmium—Total [3], mg/L: Digestion [3] followed by:					
AA direct aspiration, or	252.1	303C			
AA furnace	252.2	304			
46. Oxygen dissolved, mg/L: Winkler (Azide modification), or	360.2	421B	D888-81(C)	I-1575-78 [7]	33.028. [2]
Electrode	360.1	421F		I-1576-78 [7]	
47. Palladium—Total,[3] mg/L; Digestion [3] followed by:					
AA direct aspiration	253.1				p. S27.[9]
AA furnace	253.2				p. S28.[9]
DCP					Note 33.
48. Phenols, mg/L:					
Manual distillation [25]	420.1		D1783-80 (A or B).		Note 26.
Followed by:					
Colorimetric (4AAP) manual, or	420.1				Note 26.
Automated [19]	420.2				
49. Phosphorus (elemental) mg/L: Gas-liquid chromatography.					Note 27.
50. Phosphorus—Total, mg/L: Persulfate digestion followed by	365.2	424C(III)			33.111.[2]
Manual or	365.2 or 365.3.	424F	D515-82(A)		
Automated ascorbic acid reduction, or.	365.1	424G		I-4600-84	33.116.[2]
Semi-automated block digestor	365.4				
51. Platinum—Total,[3] mg/L; Digestion [3] followed by:					
AA direct aspiration	255.1	303A			
AA furnace	255.2	304			
DCP					Note 33.
52. Potassium—total [3], mg/L: Digestion followed by:					
AA direct aspiration	258.1	303A		I-3630-84	33.103.[2]
Inductively coupled plasma					200.7.[4]
Flame photometric, or		322B	D1428-82(A)		
Colorimetric (Cobaltinitrate)					317B.[16]
53. Residue—Total, mg/L: Gravimetric, 103-105°C.	160.3	209A		I-3750-84	
54. Residue—filterable, mg/L: Gravimetric 180°C.	160.1	209B		I-1750-84	

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TABLE IB—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter, units, and method	Reference (method No. or page)				
	EPA 1979	Standard methods 16th Ed.	ASTM	USGS[1]	Other
55. Residue—nonfilterable, (TSS), mg/L: Gravimetric, 103–105°C post washing of residue.	160.2	209C		I-3765-84	
56. Residue—settleable, mg/L: Volumetric, (Imhoff cone) or gravimetric.	160.5	209E		1	
57. Residue—Volatile. mg/L: Gravimetric, 550°C.	160.4	209D		I-3753-84	
58. Rhodium—Total[3], mg/L: Digestion[3] followed by:.					
AA direct aspiration, or	265.1	303A			
AA furnace	265.2	304			
59. Ruthenium—Total[3], mg/L: Digestion[3] followed by:					
AA direct aspiration, or	267.1	303A			
AA furnace	267.2	304			
60. Selenium—Total[3], mg/L: Digestion[3] followed by:					
AA furnace	270.2	304			
Inductively coupled plasma, or					200.7[4]
AA gaseous hydride	270.3	303E	D3859-84(A)	I-3667-84	
61. Silica—Dissolved, mg/L: 0.45 micron filtration followed by:					
Colorimetric, Manual or	370.1	425C	D859-80(B)	I-1700-84	
Automated (Molybdosilicate), or				I-2700-84	
Inductively coupled plasma					200.7.[4]
62. Silver—Total,[3,9] mg/L; Digestion[3] followed by:					
AA direct aspiration	272.1	303 A or B		I-3720-85	33.089.[3] p. 37.[9]
AA furnace	272.2	304			
Colorimetric (Dithizone)					319B.[10]
ICP, or					200.7.[4]
DCP					Note 33.
63. Sodium—Total,[3] mg/L; Digestion[3] followed by:					
AA direct aspiration	273.1	303A		I-3735-85	33.107.[3]
ICP					200.7.[4]
DCP, or					Note 33.
Flame photometric		325B	D1428-82(A)		
64. Specific conductance, micromhos/cm at 25°C: Wheatstone bridge	120.1	205	D1125-82(A)	I-1780-84	33.002.[3]
65. Sulfate (as SO_4), mg/L:					
Automated colorimetric (barium chloranilate).	375.1				
Gravimetric, or	375.3	426 A or B	D516-82(A)		33.124.[3]
Turbidimetric	375.4		D516-82(B)		426C.[29]
66. Sulfide (as S), mg/L:					
Titrimetric (iodine) or	376.1	427D		I-3840-84	228A[30]
Colorimetric (methylene blue)	376.2	427C			
67. Sulfite (as SO_3), mg/L: Titrimetric (iodine-iodate).	377.1	428A	D1339-84(C)		
68. Surfactants, mg/L: Colorimetric (methylene blue).	425.1	512B	D2330-82(A)		
69. Temperature, °C.: Thermometric	170.1	212			Note 31.
70. Thallium—Total[3], mg/L: Digestion[3] followed by:					
AA direct aspiration	279.1	303A			
AA furnace, or	279.2	304			
Inductively coupled plasma					200.7.[4]
71. Tin—Total[3], mg/L: Digestion[3] followed by:					
AA direct aspiration, or	282.1	303A		I-3850-78[7]	
AA furnace,	282.2	304			
72. Titanium—Total,[3] mg/L; Digestion[3] followed by:					
AA direct aspiration	283.1	303C			
AA furnace	283.2	304			
DCP					Note 33.

TABLE IB—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter, units, and method	Reference (method No. or page)				
	EPA 1979	Standard methods 16th Ed.	ASTM	USGS[1]	Other
73. Turbidity, NTU: Nephelometric	180.1	214A	D1889–81	I–3860–84	
74. Vanadium—Total,[3] mg/L; Digestion[3] followed by:					
AA direct aspiration	286.1	303C			
AA furnace	286.2	304			
ICP					200.7.[4]
DCP, or					Note 33.
Colorimetric (Gallic acid)		327B	D3373–84(A)		
75. Zinc—Total,[3] mg/L; Digestion[3] followed by:					
AA direct aspiration	289.1	303 A or B	D1691–84 (C or D).	I–3900–85	33.089.[2] p. 37.[9]
AA furnace	289.2	304			
ICP					200.7.[4]
DCP, or					Note 33.
Colorimetric (Dithizone) or		328C			
(Zincon)					Note 32.

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[1] "Methods for Analysis of Inorganic Substances in Water and Fluvial Sediments," U.S. Department of the Interior, U.S. Geological Survey, Open-File Report 85–495, 1986, unless otherwise stated.

[2] "Official Methods of Analysis of the Association of Official Analytical Chemists," methods manual, 14th ed. (1985).

[3] For the determination of total metals the sample is not filtered before processing. A digestion procedure is required to solubilize suspended material and to destroy possible organic-metal complexes. Two digestion procedures are given in "Methods for Chemical Analysis of Water and Wastes, 1979." One (section 4.1.3), is a vigorous digestion using nitric acid. A less vigorous digestion using nitric and hydrochloric acids (section 4.1.4) is preferred; however, the analyst should be cautioned that this mild digestion may not suffice for all sample types. Particularly, if a colorimetric procedure is to be employed, it is necessary to ensure that all organo-metallic bonds be broken so that the metal is in a reactive state. In those situations, the vigorous digestion is to be preferred making certain that at no time does the sample go to dryness. Samples containing large amounts of organic materials would also benefit by this vigorous digestion. Use of the graphite furnace technique, inductively coupled plasma, as well as determinations for certain elements such as arsenic, the noble metals, mercury, selenium, and titanium require a modified digestion and in all cases the method write-up should be consulted for specific instruction and/or cautions.

NOTE: If the digestion included in one of the other approved references is different than the above, the EPA procedure must be used.

Dissolved metals are defined as those constituents which will pass through a 0.45 micron membrane filter. Following filtration of the sample, the referenced procedure for total metals must be followed. Sample digestion for dissolved metals may be omitted for AA (direct aspiration or graphite furnace) and ICP analyses provided the sample solution to be analyzed meets the following criteria:

a. has a low COD (<20)
b. is visibly transparent with a turbidity measurement of 1 NTU or less.
c. is colorless with no perceptable odor, and
d. is of one liquid phase and free of particulate or suspended matter following acidification.

[4] The full text of Method 200.7, "Inductively Coupled Plasma Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes," is given at Appendix C of this Part 136.

[5] Manual distillation is not required if comparability data on representative effluent samples are on company file to show that this preliminary distillation step is not necessary; however, manual distillation will be required to resolve any controversies.

[6] Ammonia, Automated Electrode Method, Industrial Method Number 379–75 WE, dated February 19, 1976, Technicon AutoAnalyzer II, Technicon Industrial Systems, Tarrytown, NY. 10591.

[7] The approved method is that cited in "Methods for Determination of Inorganic Substances in Water and Fluvial Sediments", USGS TWRI, Book 5, Chapter A1 (1979).

[8] American National Standard on Photographic Processing Effluents, Apr. 2, 1975. Available from ANSI, 1430 Broadway, New York, NY 10018.

[9] "Selected Analytical Methods Approved and Cited by the United States Environmental Protection Agency," Supplement to the Fifteenth Edition of *Standard Methods for the Examination of Water and Wastewater* (1981).

[10] The use of normal and differential pulse voltage ramps to increase sensitivity and resolution is acceptable.

[11] Carbonaceous biochemical oxygen demand ($CBOD_5$) must not be confused with the traditional BOD_5 test which measures "total BOD." The addition of the nitrification inhibitor is not a procedural option, but must be included to report the $CBOD_5$ parameter. A discharger whose permit requires reporting the traditional BOD_5 may not use a nitrification inhibitor in the procedure for reporting the results. Only when a discharger's permit specifically states $CBOD_5$ is required, can the permittee report data using the nitrification inhibitor.

[12] OIC Chemical Oxygen Demand Method, Oceanography International Corporation, 512 West Loop, P.O. Box 2980, College Station, TX 77840.

[13] Chemical Oxygen Demand, Method 8000, Hach Handbook of Water Analysis, 1979, Hach chemical Company, P.O. Box 389, Loveland, CO 80537.

[14] The back titration method will be used to resolve controversy.

[15] Orion Research Instruction Manual, Residual Chlorine Electrode Model 97–70, 1977, Orion Research Incorporated, 840 Memorial Drive, Cambridge, MA 02138.

[16] The approved method is that cited in *Standard Methods for the Examination of Water and Wastewater*, 14th Edition, 1976.

[17] National Council of the Paper Industry for Air and Stream Improvement, (Inc.) Technical Bulletin 253, December 1971.

[18] Copper, Biocinchoinate Method, Method 8506, Hach Handbook of Water Analysis, 1979, Hach Chemical Company, P.O. Box 389, Loveland, CO 80537.

[19] After the manual distillation is completed, the autoanalyzer manifolds in EPA Methods 335.3 (cyanide) or 420.2 (ph are simplified by connecting the re-sample line directly to the sampler. When using the manifold setup shown in Method 3 the buffer 6.2 should be replaced with the buffer 7.6 found in Method 335.2.

[20] Hydrogen Ion (pH) Automated Electrode Method, Industrial Method Number 378-75WA, October 1976, Technicon Analyzer II, Technicon Industrial Systems, Tarrytown, NY 10591.

[21] Iron, 1,10-Phenanthroline Method, Method 8008, 1980, Hach Chemical Company, P.O. Box 389, Loveland, CO 8

[22] Manganese, Periodate Oxidation Method, Method 8034, Hach Handbook of Wastewater Analysis, 1979, pages 2-113 2-117, Hach Chemical Company, Loveland, CO 80537.

[23] Goerlitz, D., Brown, E., "Methods for Analysis of Organic Substances in Water," U.S. Geological Survey Technique Water-Resources Inv., book 5, ch. A3, page 4 (1972).

[24] Nitrogen, Nitrite, Method 8507, Hach Chemical Company, P.O. Box 389, Loveland, CO 80537.

[25] Just prior to distillation, adjust the sulfuric-acid-preserved sample to pH 4 with 1 + 9 NaOH.

[26] The approved method is that cited in *Standard Methods for the Examination of Water and Wastewater*, 14th Edition, colorimetric reaction is conducted at a pH of 10.0±0.2. The approved methods are given on pp. 576-81 of the 14th Ed Method 510A for distillation, Method 510B for the manual colorimetric procedure, or Method 510C for the m spectrophotometric procedure.

[27] R. F. Addison and R. G. Ackman, "Direct Determination of Elemental Phosphorus by Gas-Liquid Chromatograp *Journal of Chromatography*, vol. 47, No. 3, pp. 421-426, 1970.

[28] Approved methods for the analysis of silver in industrial wastewaters at concentrations of 1 mg/L and above inadequate where silver exists as an inorganic halide. Silver halides such as the bromide and chloride are relatively insolub reagents such as nitric acid but are readily soluble in an aqueous buffer of sodium thiosulfate and sodium hydroxide to a p 12. Therefore, for levels of silver above 1 mg/L, 20 mL of sample should be diluted to 100 mL by adding 40 mL each of $Na_2S_2O_3$ and 2M NaOH. Standards should be prepared in the same manner. For levels of silver below 1 mg/L the appro method is satisfactory.

[29] The approved method is that cited in *Standard Methods for the Examination of Water and Wastewater*, 15th Ed

[30] The approved method is that cited in *Standard Methods for the Examination of Water and Wastewater*, 13th Ed

[31] Stevens, H. H., Ficke, J. F., and Smoot, G. F., "Water Temperature—Influential Factors, Field Measurement and D Presentation," U.S. Geological Survey, Techniques of Water Resources Investigations, Book 1, Chapter D1, 1975.

[32] Zinc, Zincon Method, Method 8009, Hach Handbook of Water Analysis, 1979, pages 2-231 and 2-333, Hach Chem Company, Loveland, CO 80537.

[33] "Direct Current Plasma (DCP) Optical Emission Spectometric Method for Trace Elemental Analysis of Water and Wa Method AES0029." 1986, Applied Research Laboratories, Inc., 24911 Avenue Stanford, Valencia, CA 91355.

TABLE IC—LIST OF APPROVED TEST PROCEDURES FOR NON-PESTICIDE ORGANIC COMPOUNDS

Parameter [1]	EPA Method Number [2, 7]			Other
	GC	GC/MS	HPLC	
1. Acenaphthene	610	625, 1625	610	
2. Acenaphthylene	610	625, 1625	610	
3. Acrolein	603	[4]624, 1624		
4. Acrylonitrile	603	[4]624, 1624		
5. Anthracene	610	625, 1625	610	
6. Benzene	602	624, 1624		
7. Benzidine		[5]625, 1625	605	Note 3, p. 1;
8. Benzo(a)anthracene	610	625, 1625	610	
9. Benzo(a)pyrene	610	625, 1625	610	
10. Benzo(b)fluoranthene	610	625, 1625	610	
11. Benzo(g,h,i)perylene	610	625, 1625	610	
12. Benzo(k)fluoranthene	610	625, 1625	610	
13. Benzyl chloride				Note 3, p. 130; Note 6, p. S102.
14. Benzyl butyl phthalate	606	625, 1625		
15. Bis(2-chloroethoxy) methane	611	625, 1625		
16. Bis(2-chloroethyl) ether	611	625, 1625		
17. Bis(2-ethylhexyl) phthalate	606	625, 1625		
18. Bromodichloromethane	601	624, 1624		
19. Bromoform	601	624, 1624		
20. Bromomethane	601	624, 1624		
21. 4-Bromophenylphenyl ether	611	625, 1625		
22. Carbon tetrachloride	601	624, 1624		Note 3, p. 130;
23. 4-Chloro-3-methylphenol	604	625, 1625		
24. Chlorobenzene	601, 602	624, 1624		Note 3, p. 130;
25. Chloroethane	601	624, 1624		
26. 2-Chloroethylvinyl ether	601	624, 1624		
27. Chloroform	601	624, 1624		Note 3, p. 130;
28. Chloromethane	601	624, 1624		
29. 2-Chloronaphthalene	612	625, 1625		
30. 2-Chlorophenol	604	625, 1625		
31. 4-Chlorophenylphenyl ether	611	625, 1625		
32. Chrysene	610	625, 1625	610	
33. Dibenzo(a,h)anthracene	610	625, 1625	610	
34. Dibromochloromethane	601	624, 1624		
35. 1,2-Dichlorobenzene	601, 602, 612	624, 625, 1625		

TABLE IC—LIST OF APPROVED TEST PROCEDURES FOR NON-PESTICIDE ORGANIC COMPOUNDS—Continued

Parameter [1]	EPA Method Number [2, 7]			Other
	GC	GC/MS	HPLC	
36. 1,3-Dichlorobenzene	601, 602, 612	624, 625, 1625		
37. 1,4-Dichlorobenzene	601, 602, 612	625, 1624, 1625		
38. 3,3′-Dichlorobenzidine		625, 1625	605	
39. Dichlorodifluoromethane	601			
40. 1,1-Dichloroethane	601	624, 1624		
41. 1,2-Dichloroethane	601	624, 1624		
42. 1,1-Dichloroethene	601	624, 1624		
43. trans-1,2-Dichloroethene	601	624, 1624		
44. 2,4-Dichlorophenol	604	625, 1625		
45. 1,2-Dichloropropane	601	624, 1624		
46. cis-1,3-Dichloropropene	601	624, 1624		
47. trans-1,3-Dichloropropene	601	624, 1624		
48. Diethyl phthalate	606	625, 1625		
49. 2,4-Dimethylphenol	604	625, 1625		
50. Dimethyl phthalate	606	625, 1625		
51. Di-n-butyl phthalate	606	625, 1625		
52. Di-n-octyl phthalate	606	625, 1625		
53. 2,4-Dinitrophenol	604	625, 1625		
54. 2,4-Dinitrotoluene	609	625, 1625		
55. 2,6-Dinitrotoluene	609	625, 1625		
56. Epichlorohydrin				Note 3, p. 130; Note 6, p. S102.
57. Ethylbenzene	602	624, 1624		
58. Fluoranthene	610	625, 1625	610	
59. Fluorene	610	625, 1625	610	
60. Hexachlorobenzene	612	625, 1625		
61. Hexachlorobutadiene	612	625, 1625		
62. Hexachlorocyclopentadiene	612	[8]625, 1625		
63. Hexachloroethane	612	625, 1625		
64. Ideno(1,2,3-cd)pyrene	610	625, 1625	610	
65. Isophorone	609	625, 1625		
66. Methylene chloride	601	624, 1624		Note 3, p. 130;
67. 2-Methyl-4,6-dinitrophenol	604	625, 1625		
68. Naphthalene	610	625, 1625	610	
69. Nitrobenezene	609	625, 1625		
70. 2-Nitrophenol	604	625, 1625		
71. 4-Nitrophenol	604	625, 1625		
72. N-Nitrosodimethylamine	607	625, 1625		
73. N-Nitrosodi-n-propylamine	607	[8]625, 1625		
74. N-Nitrosodiphenylamine	607	[8]625, 1625		
75. 2,2′-Oxybis(1-chloropropane)	611	625, 1625		
76. PCB-1016	608	625		Note 3, p. 43;
77. PCB-1221	608	625		Note 3, p. 43;
78. PCB-1232	608	625		Note 3, p. 43;
79. PCB-1242	608	625		Note 3, p. 43;
80. PCB-1248	608	625		Note 3, p. 43;
81. PCB-1254	608	625		Note 3, p. 43;
82. PCB-1260	608	625		Note 3, p. 43;
83. Pentachlorophenol	604	625, 1625		Note 3, p. 140;
84. Phenanthrene	610	625, 1625	610	
85. Phenol	604	625, 1625		
86. Pyrene	610	625, 1625	610	
87. 2,3,7,8-Tetrachlorodibenzo-p-dioxin		[13]613		
88. 1,1,2,2-Tetrachloroethane	601	624, 1624		Note 3, p. 130;
89. Tetrachloroethene	601	624, 1624		Note 3, p. 130;
90. Toluene	602	624, 1624		
91. 1,2,4-Trichlorobenzene	612	625, 1625		Note 3, p. 130;
92. 1,1,1-Trichloroethane	601	624, 1624		
93. 1,1,2-Trichloroethane	601	624, 1624		Note 3, p. 130;
94. Trichloroethene	601	624, 1624		
95. Trichlorofluoromethane	601	624		
96. 2,4,6-Trichlorophenol	604	625, 1625		
97. Vinyl chloride	601	624, 1624		

Table IC Notes

[1] All parameters are expressed in micrograms per liter (µg/L).

[2] The full text of Methods 601-613, 624, 625, 1624, and 1625, are given at Appendix A, "Test Procedures for Analysis of Organic Pollutants," of this Part 136. The standardized test procedure to be used to determine the method detection limit (MDL) for these test procedures is given at Appendix B, "Definition and Procedure for the Determination of the Method Detection Limit," of this Part 136.

[3] "Methods for Benzidine; Chlorinated Organic Compounds, Pentachlorophenol and Pesticides in Water and Wastewater," U.S. Environmental Protection Agency, September, 1978.

[4] Method 624 may be extended to screen samples for Acrolein and Acrylonitrile. However, when they are known to be present, the preferred method for these two compounds is Method 603 or Method 1624.

[5] Method 625 may be extended to include benzidine, hexachlorocyclopentadiene, N-nitrosodimethyamine, and N-nitrosodiphenylamine. However, when they are known to be present, Methods 605, 607, and 612, or Method 1625, are preferred methods for these compounds.

[5a] 625, Screening only.

[6] "Selected Analytical Methods Approved and Cited by the United States Environmental Protection Agency," Supplement to the Fifteenth Edition of *Standard Methods for the Examination of Water and Wastewater* (1981).

[7] Each analyst must make an initial, one-time, demonstration of their ability to generate acceptable precision and accuracy with Methods 601-613, 624, 625, 1624, and 1625 (See Appendix A of this Part 136) in accordance with procedures each in section 8.2 of each of these Methods. Additionally, each laboratory, on an on-going bases must spike and analyze 10% (5% for Methods 624 and 625 and 100% for methods 1624, and 1625) of all samples to monitor and evaluate laboratory data quality in accordance with sections 8.3 and 8.4 of these Methods. When the recovery of any parameter falls outside the warning limits, the analytical results for that parameter in the unspiked sample are suspect and cannot be reported to demonstrate regulatory compliance.

NOTE: These warning limits are promulgated as an "interim final action with a request for comments."

TABLE ID—LIST OF APPROVED TEST PROCEDURES FOR PESTICIDES [1]

Parameter μg/L)	Method	EPA [3,7]	Standard Methods 15th Ed	ASTM	Other
1. Aldrin	GC	608	509A	D3086	Note 3, p. 7; Note 4, p. 30.
	GC/MS	625			
2. Ametryn	GC				Note 3, p. 83; Note 6, p. S68.
3. Aminocarb	TLC				Note 3, p. 94; Note 6, p. S16.
4. Atraton	GC				Note 3, p. 83; Note 6, p. S68.
5. Atrazine	GC				Note 3, p. 83; Note 6, p. S68.
6. Azinphos methyl	GC				Note 3, p. 25; Note 6, p. S51.
7. Barban	TLC				Note 3, p. 104; Note 6, p. S64.
8. α-BHC	GC	608	509A	D3086	Note 3, p. 7.
	GC/MS	[8] 625			
9. β-BHC	GC	608		D3086	
	GC/MS	625			
10. δ-BHC	GC	608		D3086	
	GC/MS	[8] 625			
11. γ-BHC (Lindane)	GC	608	509A	D3086	Note 3, p. 7; Note 4, p. 30.
	GC/MS	625			
12. Captan	GC		509A		Note 3, p. 7.
13. Carbaryl	TLC				Note 3, p. 94; Note 6, p. S60.
14. Carbophenothion	GC				Note 4, p. 30; Note 6, p. S73.
15. Chlordane	GC	608	509A	D3086	Note 3, p. 7.
	GC-MS	625			
16. Chloropropham	TLC				Note 3, p. 104; Note 6, p. S64.
17. 2,4-D	GC		509B		Note 3, p. 115; Note 4, p. 35.
18. 4,4'-DDD	GC	608	509A	D3086	Note 3, p. 7; Note 4, p. 30.
	GC-MS	625			
19. 4,4'-DDE	GC	608	509A	D3086	Note 3, p. 7; Note 4, p. 30.
	GC/MS	625			
20. 4,4'-DDT	GC	608	509A	D3086	Note 3, p. 7; Note 4, p. 30.
	GC/MS	625			
21. Demeton-O	GC				Note 3, p. 25; Note 6, p. S51.
22. Dementon-S	GC				Note 3, p. 25; Note 6, p. S51.
23. Diazinon	GC				Note 3, p. 25; Note 4, p. 30; Note 6, p. S51.
24. Dicamba	GC				Note 3, p. 115.
25. Dichlofenthion	GC				Note 4, p. 30; Note 6, p. S73.
26. Dichloran	GC		509A		Note 3, p. 7.
27. Dicofol	GC			D3086	
28. Dieldrin	GC	608	509A		Note 3, p. 7; Note 4, p. 30.
	GC/MS	625			
29. Dioxathion	GC				Note 4, p. 30; Note 6, p. S73.
30. Disulfoton	GC				Note 3, p. ; Note 6, p. S51.
31. Diuron	TLC				Note 3, p. 104; Note 6, p. S64.
32. Endosulfan I	GC	608	509A	D3086	Note 3, p. 7.
	GC/MS	[8] 625			
33. Endosulfan II	GC	608	509A	D3086	Note 3, p. 7.
	GC/MS	[8] 625			

TABLE ID—LIST OF APPROVED TEST PROCEDURES FOR PESTICIDES[1]—Continued

Parameter µg/L)	Method	EPA[2,7]	Standard Methods 15th Ed	ASTM	Other
34. Endosulfan sulfate	GC	608			
	GC/MS	625			
35. Endrin	GC	608	509A	D3086	Note 3, p. 7; Note 4, p. 30.
	GC/MS	[5] 625			
36. Endrin aldehyde	GC	608			
	GC/MS	625			
37. Ethion	GC				Note 4, p. 30; Note 6, p. S73.
38. Fenuron	TLC				Note 3, p. 104; Note 6, p. S64.
39. Fenuron-TCA	TLC				Note 3, p. 104; Note 6, p. S64.
40. Heptachlor	GC	608	509A	D3086	Note 3, p. 7; Note 4, p. 30.
	GC/MS	625			
41. Heptachlor epoxide	GC	608	509A	D3086	Note 3, p. 7; Note 4, p. 30; Note 6, p. S73.
	GC/MS	625			
42. Isodrin	GC				Note 4, p. 30; Note 6, p. S73.
43. Linuron	TLC				Note 3, p. 104; Note 6, p. S64.
44. Malathion	GC		509A		Note 3, p. 25; Note 4, p. 30; Note 6, p. S51.
45. Methiocarb	TLC				Note 3, p. 94; Note 6, p. S60.
46. Methoxychlor	GC		509A	D3086	Note 3, p. 7; Note 4, p. 30.
47. Mexacarbate	TLC				Note 3, p. 94; Note 6, p. S60.
48. Mirex	GC		509A		Note 3, p. 7.
49. Monuron	TLC				Note 3, p. 104; Note 6, p. S64.
50. Monuron-TCA	TLC				Note 3, p. 104; Note 6, p. S64.
51, Neburon	TLC				Note 3, p. 104; Note 6, p. S64.
52. Parathion methyl	GC		509A		Note 3, p. 25; Note 4, p. 30.
53. Parathion ethyl	GC		509A		Note 3, p. 25.
54. PCNB	GC		509A		Note 3, p. 7.
55. Perthane	GC			D3086	
56. Prometron	GC				Note 3, p. 83; Note 6, p. S68.
57. Prometryn	GC				Note 3, p. 83; Note 6, p. S68.
58. Propazine	GC				Note 3, p. 83; Note 6, p. S68.
59. Propham	TLC				Note 3, p. 104; Note 6, p. S64.
60. Propoxur	TLC				Note 3, p. 94; Note 6, p. S60.
61. Secbumeton	TLC				Note 3, p. 83; Note 6, p. S68.
62. Siduron	TLC				Note 3, p. 104; Note 6, p. S64.
63. Simazine	GC				Note 3, p. 83; Note 6, p. S68.
64. Strobane	GC		509A		Note 3, p. 7.
65. Swep	TLC				Note 3, p. 104; Note 6, p. S64.
66. 2,4,5-T	GC		509B		Note 3, p. 115; Note 4, p. 35.
67. 2,4,5-TP (Silvex)	GC		509B		Note 3, p. 115.
68. Terbuthylazine	GC				Note 3, p. 83; Note 6, p. S68.
69. Toxaphene	GC	608	509A	D3086	Note 3, p. 7; Note 4, p. 30.
	GC/MS	625			
70. Trifluralin	GC		509A		Note 3, p. 7

Table ID Notes

[1] Pesticides are listed in this table by common name for the convenience of the reader. Additional pesticides may be found under Table IC, where entries are listed by chemical name.

[2] The full text of methods 608 and 625 are given at Appendix A, "Test Procedures for Analysis of Organic Pollutants," of this Part 136. The standardized test procedure to be used to determine the method detection limit (MDL) for these test procedures is given at Appendix B, "Definition and Procedure for the Determination of the Method Detection Limit", of this Part 136.

[3] "Methods for Benzidine, Chlorinated Organic Compounds, Pentachlorophenol and Pesticides in Water and Wastewater," U.S. Environmental Protection Agency, September, 1978. This EPA publication includes thin-layer chromatography (TLC) methods.

[4] "Methods for Analysis of Organic Substances in Water," U.S. Geological Survey, Techniques of Water-Resources Investigations, Book 5, Chapter A3 (1972).

[5] The method may be extended to include α-BHC, δ-BHC, endosulfan I, endosulfan II, and endrin. However, when they are known to exist, Method 608 is the preferred method.

[6] "Selected Analytical Methods Approved and Cited by the United States Environmental Protection Agency," Supplement to the Fifteenth Edition of *Standard Methods for the Examination of Water and Wastewater* (1981).

[7] Each analyst must make an initial, one-time, demonstration of their ability to generate acceptable precision and accuracy with Methods 608 and 625 (See Appendix A of this Part 136) in accordance with procedures given in section 8.2 of each of these methods. Additionally, each laboratory, on an on-going basis, must spike and analyze 10% of all samples analyzed with Method 608 or 5% of all samples analyzed with Method 625 to monitor and evaluate laboratory data quality in accordance with Sections 8.3 and 8.4 of these methods. When the recovery of any parameter falls outside the warning limits, the analytical results for that parameter in the unspiked sample are suspect and cannot be reported to demonstrate regulatory compliance.

NOTE: These warning limits are promulgated as an "interim final action with a request for comments."

TABLE IE—LIST OF APPROVED RADIOLOGICAL TEST PROCEDURES

Parameter and units	Methods	EPA [1]	Reference (method No. or page)		
			Standard methods 16th ed.	ASTM	USGS [2]
1. Alpha-Total, pCi per liter	Proportional or scintillation counter.	900.0	703	D1943-81	pp. 75 and 78.[3]
2. Alpha-Counting error, pCi per liter.	Proportional or scintillation counter.	Appendix B	703	D1943-81	p. 79.
3. Beta-Total, pCi per liter	Proportional counter	900.0	703	D1890-81	pp. 75 and 78.[3]
4. Beta-Counting error, pCi	Proportional counter	Appendix B	703	D1890-81	p. 79.
5. (a) Radium-Total, pCi per liter.	Proportional counter	903.0	705	D2460-70	
(b)^{226}Ra, pCi per liter	Scintillation counter	903.1	706	D3454-79	p. 81.

TABLE IE NOTES:

[1] "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032 (1980 update), U.S. Environmental Protection Agency, August 1980.

[2] Fishman, M.J. and Brown, Eugene, "Selected Methods of the U.S. Geological Survey of Analysis of Wastewaters," U.S. Geological Survey, Open-File Report 76-177 (1976).

[3] The method found on p. 75 measures only the dissolved portion while the method on p. 78 measures only the suspende portion. Therefore, the two results must be added to obtain the "total."

(b) The full texts of the methods from the following references which are cited in Tables IA, IB, IC, ID, and IE are incorporated by reference into this regulation and may be obtained from the sources identified. All costs cited are subject to change and must be verified from the indicated sources. The full texts of all the test procedures cited are available for inspection at the Office of the Federal Register, Room 8301, 1110 L Street, NW., Washington, DC 20408.

REFERENCES, SOURCES, COSTS, AND TABLE CITATIONS:

(1) The full texts of Methods 601-613, 624, 625, 1624, and 1625 are printed in Appendix A of this Part 136. The full text for determining the method detection limit when using the test procedures is given in Appendix B of this Part 136. The full text of Method 200.7 is printed in Appendix C of this Part 136. Cited in: Table IB, Note 4; Table IC, Note 2; and Table ID, Note 2.

(2) "Microbiological Methods for Monitoring the Environment, Water and Wastes," U.S. Environmental Protection Agency, EPA-600/8-78-017, 1978. Available from: ORD Publications, CERI, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268. Table IA, Note 2.

(3) "Methods for Chemical Analysis of Water and Wastes," U.S. Environmental Protection Agency, EPA-600/4-79-020, March, 1979. Available from ORD Publications, CERI, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268. Table IB.

(4) "Methods for Benzidine, Chlorinated Organic Compounds, Pentachlorophenol and Pesticides in Water and Wastewater," U.S. Environmental Protection Agency, 1978. Available from: ORD Publications, CERI, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268. Table IC, Note 3; Table ID, Note 3.

(5) "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," U.S. Environmental Protection Agency, EPA-600/4-80-032, 1980. Available from ORD Publications, CERI, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268. Table IE, Note 1.

(6) *Standard Methods for the Examination of Water and Wastewater*, Joint Editorial Board, American Public Health Association, American Water Works Association, and Water Pollution Control Federation, 16th Edition, 1985. Available from: American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20036. Cost $90.00. Tables IB and IE.

(7) Ibid, 15th Edition. Table IA; Table IB, note 29; Table ID.

(8) Ibid, 14th Edition. Table IB, Notes 16 and 26.

(9) Ibid, 13th Edition. Table IB, Note 30.

(10) "Selected Analytical Methods Approved and Cited by the United States Environmental Protection Agency," Supplement to the 15th Edition of *Standard Methods for the Examination of Water and Wastewater*, 1981. Available from: American Public Health Association, 1015 Fifteenth Street NW. Washington, DC 20036. Cost available from publisher. Table IB, Note 9; Table IC, Note 6; Table ID, Note 6.

(11) "Annual Book of Standards, section 11, Water," American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103. Cost available from publisher. Tables IB, ID, and IE.

(12) "Methods for Collection and Analysis of Aquatic Biological and Microbiological Samples," edited by P.E. Greason, TA

Ehlke, G.A. Irwin, B.W. Lium, and K.V. Slack, U.S. Geological Survey, Techniques of Water Resources Investigation (USGS TWRI), Book 5, Chapter A4 (1977). Available from: U.S. Geological Survey, Branch of Distribution, 1200 South Eads Street, Arlington, VA 22202. Cost: $9.25 (subject to change). Table IA.

(13) "Methods for Determination of Inorganic Substances in Water and Fluvial Sediments," by M.J. Fishman and Linda C. Friedman; U.S. Geological Survey Open File Report 85-495 (1986). Available from U.S. Geological Survey, Western Distribution Branch, Box 24525, Denver Federal Center, Denver, CO 80225. Cost $108.75 (subject to change). Table IB, Note 1.

(14) "Methods for Determination of Inorganic Substances in Water and Fluvial Sediments," N.W. Skougstad and others, editors. USGS TWRI, Book 5, Chapter A1 (1979). Available from U.S. Geological Survey, Branch of Distribution, 1200 South Eads Street, Arlington, VA 22202. Cost $10.00 (subject to change). Table IB, Note 7.

(15) "Methods for Analysis of Organic Substances in Water," by D.F. Goerlitz and Eugene Brown: USGS TWRI, Book 5, Chapter A3 (1972). Available from U.S. Geological Survey, Branch of Distribution, 1200 South Eads Street, Arlington, VA 22202. Cost $0.90 (subject to change). Table IB, Note 23; Table ID, Note 4.

(16) "Water Temperature—Influential Factors, Field Measurement and Data Presentation," by H.H. Stevens, Jr., J. Ficke, and G.F. Smoot: USGS TWRI Book 1, Chapter D1, 1975. Available from U.S. Geological Survey, Branch of Distribution, 1200 South Eads Street, Arlington, VA 22202. Cost $1.60 (subject to change). Table IB, Note 31.

(17) "Selected Methods of the U.S. Geological Survey of Analysis of Wastewaters," by M.J. Fishman and Eugene Brown: U.S. Geological Survey Open File Report 76-77 (1976). Available from U.S. Geological Survey, Branch of Distribution, 1200 South Eads Street, Arlington, VA 22202. Cost $13.50 (subject to change). Table IE, Note 2.

(18) Official Methods of Analysis of the Association of Official Analytical Chemicals, methods manual, 14th Edition (1985). Price: $145.50. Available from: The Association of Official Analytical Chemicals, 1111 N. 19th Street, Suite 210, Arlington, VA 22209. Table IB, Note 2.

(19) "American National Standard on Photographic Processing Effluents," April 2, 1975. Available from: American National Standards Institute, 1430 Broadway, New York, New York 10018. Table IB, Note 8.

(20) "An Investigation of Improved Procedures for Measurement of Mill Effluent and Receiving Water Color," NCASI Technical Bulletin No. 253, December 1971. Available from: National Council of the Paper Industry for Air and Stream Improvements, Inc., 260 Madison Avenue. Cost available from publisher. Table IB, Note 17.

(21) Ammonia, Automated Electrode Method, Industrial Method Number 379-75WE, dated February 19, 1976. Technicon AutoAnalyzer II. Method and price available from Technicon Industrial Systems, Tarrytown, New York 10591. Table IB, Note 6.

(22) Chemical Oxygen Demand, Method 8000, Hach Handbook of Water Analysis, 1979. Method and price available from Hach Chemical Company, P.O. Box 389, Loveland, Colorado 80537. Table IB, Note 13.

(23) OIC Chemical Oxygen Demand Method. Method and price available from Oceanography International Corporation, 512 West Loop, P.O. Box 2980, College Station, Texas 77840. Table IB, Note 12.

(24) ORION Research Instruction Manual, Residual Chlorine Electrode Model 97-70, 1977. Method and price available from Orion Research Incorporation, 840 Memorial Drive, Cambridge, Massachusetts 02138. Table IB, Note 15.

(25) Bicinchoninate Method for Copper. Method 8506, Hach Handbook of Water Analysis, 1979, Method and price available from Hach Chemical Company, P.O. Box 300, Loveland, Colorado 80537. Table IB, Note 18.

(26) Hydrogen Ion (pH) Automated Electrode Method, Industrial Method Number 378-75WA. October 1976. Technicon AutoAnalyzer II. Method and price available from Technicon Industrial Systems, Tarrytown, New York 10591. Table IB, Note 20

(27) 1, 10-Phenanthroline Method for Iron, Hach Method 8008. Method and price available from Hach Chemical Company, P.O. Box 389, Loveland, Colorado 80537. Table IB, Note 21.

(28) Periodate Oxidation Method for Manganese, Method 8034. Hach Handbook for Water Analysis, 1979. Method and price available from Hach Chemical Company, P.O. Box 389, Loveland, Colorado 80537. Table IB, Note 22.

(29) Nitrite Nitrogen, Hach Method 8507. Method and price available from Hach Chemical Company, P.O. Box 389, Loveland, Colorado 80537. Table IB, Note 24.

(30) Zincon Method for Zinc, Method 8009, Hach Handbook for Water Analysis, 1979. Method and price available from Hach Chemical Company, P.O. Box 389, Loveland, Colorado 80537. Table IB, Note 32.

(31) "Direct Determination of Elemental Phosphorus by Gas-Liquid Chromatography," by R.F. Addison and R.G. Ackman, Journal of Chromatography, Volume 47, No. 3, pp. 421–426, 1970. Available in most public libraries. Back volumes of the Journal of Chromatography are available from Elsevier/North-Holland, Inc., Journal Information Centre, 52 Vanderbilt Avenue, New

York, NY 10164. Cost available from publisher. Table IB, Note 27.

(c) Under certain circumstances the Regional Administrator or the Director in the Region or State where the discharge will occur may determine for a particular discharge that additional parameters or pollutants must be reported. Under such circumstances, additional test procedures for analysis of pollutants may be specified by the Regional Administrator, or the Director upon the recommendation of the Director of the Environmental Monitoring and Support Laboratory, Cincinnati.

(d) Under certain circumstances, the Administrator may approve, upon recommendation by the Director, Environmental Monitoring and Support Laboratory, Cincinnati, additional alternate test procedures for nationwide use.

(e) Sample preservation procedures, container materials, and maximum allowable holding times for parameters cited in Tables IA, IB, IC, ID, and IE are prescribed in Table II. Any person may apply for a variance from the prescribed preservation techniques, container materials, and maximum holding times applicable to samples taken from a specific discharge. Applications for variances may be made by letters to the Regional Administrator in the Region in which the discharge will occur. Sufficient data should be provided to assure such variance does not adversely affect the integrity of the sample. Such data will be forwarded by the Regional Administrator to the Director of the Environmental Monitoring and Support Laboratory in Cincinnati, Ohio for technical review and recommendations for action on the variance application. Upon receipt of the recommendations from the Director of the Environmental Monitoring and Support Laboratory, the Regional Administrator may grant a variance applicable to the specific discharge to the applicant. A decision to approve or deny a variance will be made within 90 days of receipt of the application by the Regional Administrator.

TABLE II—REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES

Parameter No./name	Container [1]	Preservation [2,3]	Maximum holding tim
Table IA—Bacterial Tests:			
1–4. Coliform, fecal and total	P, G	Cool, 4°C, 0.008% $Na_2S_2O_3$ [5]	6 hours.
5. Fecal streptococci	P, G	......do	Do.
Table IB—Inorganic Tests:			
1. Acidity	P, G	Cool, 4°C	14 days.
2. Alkalinity	P, G	......do	Do.
4. Ammonia	P, G	Cool, 4°C, H_2SO_4 to pH<2	28 days.
9. Biochemical oxygen demand	P, G	Cool, 4°C	48 hours.
11. Bromide	P, G	None required	28 days.
14. Biochemical oxygen demand, carbonaceous.	P, G	Cool, 4°C	48 hours.
15. Chemical oxygen demand	P, G	Cool, 4°C, H_2SO_4 to pH<2	28 days.
16. Chloride	P, G	None required	Do.
17. Chlorine, total residual	P, G	......do	Analyze immediately.
21. Color	P, G	Cool, 4°C	48 hours.
23–24. Cyanide, total and amenable to chlorination.	P, G	Cool, 4°C, NaOH to pH>12, 0.6g ascorbic acid [5].	14 days.[6]
25. Fluoride	P	None required	28 days.
27. Hardness	P, G	HNO_3 to pH<2, H_2SO_4 to pH<2.	6 months.
28. Hydrogen ion (pH)	P, G	None required	Analyze immediately.
31, 43. Kjeldahl and organic nitrogen	P, G	Cool, 4°C, H_2SO_4 to pH<2	28 days.
Metals:[7]			
18. Chromium VI	P, G	Cool, 4°C	24 hours.
35. Mercury	P, G	HNO_3 to pH<2	28 days.
3, 5–8, 10, 12, 13, 19, 20, 22, 26, 29, 30, 32–34, 36, 37, 45, 47, 51, 52, 58–60, 62, 63, 70–72, 74, 75. Metals, except chromium VI and mercury.	P, G	......do	6 months.
38. Nitrate	P, G	Cool, 4°C	48 hours.
39. Nitrate-nitrite	P, G	Cool, 4°C, H_2SO_4 to pH<2	28 days.
40. Nitrite	P, G	Cool, 4°C	48 hours.
41. Oil and grease	G	Cool, 4°C, H_2SO_4 to pH<2	28 days.

TABLE II—REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES—Continued

Parameter No./name	Container [1]	Preservation [2,3]	Maximum holding time [4]
42. Organic carbon	P, G	Cool, 4°C, HCl or H_2SO_4 to pH<2.	Do.
44. Orthophosphate	P, G	Filter immediately, Cool, 4°C	48 hours.
46. Oxygen, Dissolved Probe	G Bottle and top.	None required	Analyze immediately.
47. Winkler	do	Fix on site and store in dark	8 hours.
48. Phenols	G only	Cool, 4°C, H_2SO_4 to pH<2	28 days.
49. Phosphorus (elemental)	G	Cool, 4°C	48 hours.
50. Phosphorus, total	P, G	Cool, 4°C, H_2SO_4 to pH<2	28 days.
53. Residue, total	P, G	Cool, 4°C	7 days.
54. Residue, Filterable	P, G	do	7 days.
55. Residue, Nonfilterable (TSS)	P, G	do	7 days.
56. Residue, Settleable	P, G	do	48 hours.
57. Residue, volatile	P, G	do	7 days.
61. Silica	P	do	28 days.
64. Specific conductance	P, G	do	Do.
65. Sulfate	P, G	do	Do.
66. Sulfide	P, G	Cool, 4°C add zinc acetate plus sodium hydroxide to pH>9.	7 days.
67. Sulfite	P, G	None required	Analyze immediately.
68. Surfactants	P ,G	Cool, 4°C	48 hours.
69. Temperature	P, G	None required	Analyze.
73. Turbidity	P, G	Cool, 4°C	48 hours.
le IC—Organic Tests.[8]			
13, 18-20, 22, 24-28, 34-37, 39-43, 45-47, 56, 66, 88, 89, 92-95, 97. Purgeable Halocarbons.	G, Telflon-lined septum.	Cool, 4°C, 0.008% $Na_2S_2O_3$.[5]	14 days.
6, 57, 90. Purgeable aromatic hydrocarbons	do	Cool, 4°C, 0.008% $Na_2S_2O_3$[5], HC1 to pH2[9].	Do.
3, 4, Acrolein and acrylonitrile	do	Cool, 4°C, 0.008% $Na_2S_2O_3$[5]; Adjust pH to 4-5 [10].	Do.
23, 30, 44, 49, 53, 67, 70, 71, 83, 85, 96. Phenols [11].	G, Teflon-lined cap.	Cool, 4°C, 0.008% $Na_2S_2O_3$[5]	7 days until extraction, 40 days after extraction.
7, 38. Benzidines [11]	do	do	7 days until extraction. [13]
14, 17, 48, 50-52. Phthalate esters [11]	do	Cool, 4°C	7 days until extraction; 40 days after extraction.
72-74. Nitrosamines [11,14]	do	Cool, 4°C, store in dark, 0.008% $Na_2S_2O_3$[5].	Do.
76-82. PCBs [11] acrylonitrile	do	Cool, 4°C	Do.
54, 55, 65, 69. Nitroaromatics and isophorone [11]	do	Cool, 4°C, 0.008% $Na_2S_2O_3$[5] store in dark.	Do.
1, 2, 5, 8-12, 32, 33, 58, 59, 64, 68, 84, 86. Polynuclear aromatic hydrocarbons. [11].	do	do	Do.
15, 16, 21, 31, 75. Haloethers [11]	do	Cool, 4°C, 0.008% $Na_2S_2O_3$[5]	Do.
29, 35-37, 60-63, 91. Chlorinated hydrocarbons [11].	do	Cool, 4°C	Do.
87. TCDD [11]	do	Cool, 4°C, 0.008% $Na_2S_2O_3$[5]	Do.
e ID—Pesticides Tests:			
1-70. Pesticides [11]	do	Cool, 4°C, pH 5-9 [15]	Do.
e IE—Radiological Tests:			
1-5. Alpha, beta and radium	P, G	HNO_3 to pH<2	6 months.

ble II Notes

olyethylene (P) or Glass (G).

ample preservation should be performed immediately upon sample collection. For composite chemical samples each ot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve aliquot, then chemical samples may be preserved by maintaining at 4°C until compositing and sample splitting is pleted.

hen any sample is to be shipped by common carrier or sent through the United States Mails, it must comply with the rtment of Transportation Hazardous Materials Regulations (49 CFR Part 172). The person offering such material for portation is responsible for ensuring such compliance. For the preservation requirements of Table II, the Office of rdous Materials, Materials Transportation Bureau, Department of Transportation has determined that the Hazardous rials Regulations do not apply to the following materials: Hydrochloric acid (HCl) in water solutions at concentrations of % by weight or less (pH about 1.96 or greater); Nitric acid (HNO_3) in water solutions at concentrations of 0.15% by weight ss (pH about 1.62 or greater); Sulfuric acid (H_2SO_4) in water solutions at concentrations of 0.35% by weight or less (pH t 1.15 or greater); and Sodium hydroxide (NaOH) in water solutions at concentrations of 0.080% by weight or less (pH t 12.30 or less).

amples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples be held before analysis and still be considered valid. Samples may be held for longer periods only if the permittee, or monitoring laboratory, has data on file to show that the specific types of samples under study are stable for the longer and has received a variance from the Regional Administrator under § 136.3(e). Some samples may not be stable fo maximum time period given in the table. A permittee, or monitoring laboratory, is obligated to hold the sample for a sh time if knowledge exists to show that this is necessary to maintain sample stability. See § 136.3(e) for details.

[5] Should only be used in the presence of residual chlorine.

[6] Maximum holding time is 24 hours when sulfide is present. Optionally all samples may be tested with lead acetate before pH adjustments in order to determine if sulfide is present. If sulfide is present, it can be removed by the addi cadmium nitrate powder until a negative spot test is obtained. The sample is filtered and then NaOH is added to p

[7] Samples should be filtered immediately on-site before adding preservative for dissolved metals.

[8] Guidance applies to samples to be analyzed by GC, LC, or GC/MS for specific compounds.

[9] Sample receiving no pH adjustment must be analyzed within seven days of sampling.

[10] The pH adjustment is not required if acrolein will not be measured. Samples for acrolein receiving no pH adjustment be analyzed within 3 days of sampling.

[11] When the extractable analytes of concern fall within a single chemical category, the specified preservative and max holding times should be observed for optimum safeguard of sample integrity. When the analytes of concern fall within t more chemical categories, the sample may be preserved by cooling to 4°C, reducing residual chlorine with 0.008% so thiosulfate, storing in the dark, and adjusting the pH to 6–9; samples preserved in this manner may be held for seven before extraction and for forty days after extraction. Exceptions to this optional preservation and holding time procedur noted in footnote 5 (re the requirement for thiosulfate reduction of residual chlorine), and footnotes 12, 13 (re the analy benzidine).

[12] If 1,2-diphenylhydrazine is likely to be present, adjust the pH of the sample to 4.0±0.2 to prevent rearrangeme benzidine.

[13] Extracts may be stored up to 7 days before analysis if storage is conducted under an inert (oxidant-free) atmosp

[14] For the analysis of diphenylnitrosamine, add 0.008% $Na_2S_2O_3$ and adjust pH to 7–10 with NaOH within 24 hour sampling.

[15] The pH adjustment may be performed upon receipt at the laboratory and may be omitted if the samples are extr within 72 hours of collection. For the analysis of aldrin, add 0.008% $Na_2S_2O_3$.

[38 FR 28758, Oct. 16, 1973, as amended at 41 FR 52781, Dec. 1, 1976; 49 FR 43251, 43 43259, Oct. 26, 1984; 50 FR 691, 692, 695, Jan. 4, 1985; 51 FR 23693, June 30, 1936; 52 33543, Sept. 3, 1987; 55 FR 24534, June 15, 1990]

EDITORIAL NOTE: Information collection requirements contained in § 136.3(e) have been approved by the Office of Management and Budget and are not effective, pendi OMB approval.

EFFECTIVE DATE NOTE: At 55 FR 24534, June 15, 1990, in § 136.3, table 1B of paragraph (a) was amended by revising entries for aluminum, barium, beryllium, boron, cadmium, calcium, chromium, cobalt, copper, gold, iron, lead, magnesium, ganese, molybdenum, nickel, palladium, platinum, silver, sodium, titanium, vanadium and zinc, and by revising footnote 33, tive July 16, 1990. For the convenience of the user the superseded text appears as follows:

§ 136.3 Identification of test procedures.

(a)* * *

TABLE IB.—LIST OF APPROVED INORGANIC TEST PROCEDURES

Parameter, units and method	Reference (method number or page)				
	EPA 1979	Std. methods, 16th Ed.	ASTM	USGS [1]	Other
* * * * *					
3. Aluminum—Total [3] mg/L: Digestion [3] followed by:					
AA direct aspiration	202.1	303C		I-3051-84	
AA furnace	202.2	304			
Inductively coupled plasma (ICP)					200.7 [4]
Direct current plasma (DCP), or					Note 33
Colorimetric (Erichrome cyanine R)		306B			
* * * * *					
7. Barium—Total [3], mg/L: Digestion [3] followed by:					
AA direct aspiration	208.1	303C		I-3084-84	
AA furnace, nr	208.2	304			
ICP, or					200.7.[4]
DCP					Note33
8. Beryllium—Total [3], mg/L: Digestion [3] followed by:					
AA direct aspiration	210.1	303C	D3654-84(A)	I-3095-84	
AA furnace	210.2	304			
ICP					200.7.[4]
DCP, or					Note 33
Colorimetric (aluminon)		309B			
* * * * *					
10. Boron—Total, mg/L:					
Colorimetric (curcumin)	212.3	404A		I-3112-84	
ICP, or					200.7.[4]
DCP					Note 33
* * * * *					
12. Cadmium—Total [3], mg/L: Digestion [3] followed by:					
AA direct aspiration	213.1	303 A or B	D3557-84 (A or B)	I-3135-84 or I-3136-84.	33.089 [2], p. 37.[9]
AA furnace	213.2	304			
ICP					200.7.[4]
DCP					Note 33
Voltametry [10], or			D3557-84(C)		
Colorimetric (Dithizone)		310B			
13. Calcium—Total [3], mg/L: Digestion [3] followed by:					
AA direct aspiration	215.1	303A	D511-84(B)	I-3152-84	
ICP					200.7.[4]
DCP, or					Note 33
Titrimetric (EDTA)	215.2	311C	D511-84(A)		
* * * * *					
19. Chromium—Total [3], mg/L: Digestion [3] followed by:					
AA direct aspiration	218.1	303A	D1687-84(D)	I-3236-84	33.089.[2]

TABLE IB.—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter, units and method	Reference (method number or page)				
	EPA 1979	Std. methods, 16th Ed.	ASTM	USGS [1]	Other
AA chelation extraction	218.3	303B			
AA furnace	218.2	304			
ICP					200.7.[4]
DCP, or					Note 33
Colorimetric (Diphenylcarbazide)		312B	D1687-84(A)		
20. Cobalt—Total [3], mg/L: Digestion [3] followed by:					
AA direct aspiration	219.1	303 A or B	D3558-84 (A or B)	I-3239-84 or I-3240-84	P. 37.[8]
AA furnace	219.2	304			
ICP					200.7.[4]
DCP					Note 33
* * * * *					
22. Copper—Total[3] mg/L: Digestion[3] followed by:					
AA direct aspiration	220.1	303 A or B	D1688-84 (D or E)	I-3270-84 or I-3271-84.	33.089[2], p. 37.[8]
AA furnace,	220.2	304			
ICP					200.7.[4]
DCP, or					Note 33
Colorimetric (Neocuproine), or		313B	D1688-84(A)		
(Bicinchoninate).					Note 18.
* * * * *					
26. Gold—Total[3], mg/L: Digestion[3] followed by:					
AA direct aspiration, or	231.1	303A			
AA furnace	231.2	304			
DCP					Note 33
* * * * *					
30. Iron—Total[3], mg/L: Digestion[3] followed by:					
AA direct aspiration,	236.1	303 A or B	D1068-84 (C or D)	I-3381-84	33.089.[2]
AA furnace	236.2	304			
ICP					200.7.[4]
DCP, or					Note 33
Colorimetric (Phenanthroline)		315B	D1068-84(A)		Note 21.
* * * * *					
32. Lead—Total [3], mg/L: Digestion [3] followed by:					
AA direct aspiration	239.1	303 A or B	D3559-85 (A or B)	I-3399-84	33.089.[2]
AA furnace	239.2	304			
ICP					200.7 [4]
DCP, or					Note 33
Voltametry [10], or			D3559-85(C)		
Colorimetric (Dithizone)		316B			

33. Magnesium—Total [3], mg/L: Digestion [3] followed by:					
AA direct aspiration	242.1	303A	D511-84(B)	I-3447-84	33.089.[2]
ICP					200.7.[4]
DCP or					Note 33
Gravimetric		318B	D511-77(A)		
34. Manganese—Total [3], mg/L: Digestion [3] followed by:					
AA direct aspiration	243.1	303 A or B	D858-84 (B or (C)	I-3454-84	33.089.[2]
AA furnace	243.2	304			
ICP					200.7.[4]
DCP, or					Note 33
Colorimetric (Persulfate), or		319B	D858-84(A)		33.126 [2].
(Periodate)					Note 22.
* * * * *					
36. Molybdenum—Total [3], mg/L: Digestion [3] followed by:					
AA direct aspiration,	246.1	303C		I-3490-84	
AA furnace, or	246.2	304			
ICP, or					200.7.[4]
DCP					Note 33
37. Nickel—Total [3], mg/L: Digestion [3] followed by:					
AA direct aspiration	249.1	303 A or B	D1886-84 (C or D)	I-3499-84	
AA furnace	249.2	304			
ICP					200.7.[4]
DCP, or					Note 33
Colorimetric (Heptoxime)		321B			
* * * * *					
47. Palladium—Total [3], mg/L: Digestion [3] followed by:					
AA direct aspiration, or	253.1				P. S27.[9]
AA furnace	253.2				P. S28.[9]
DCP					Note 33
* * * * *					
51. Platinum—Total [3], mg/L: Digestion [3] followed by:					
AA direct aspiration	255.1	303A			
AA furnace	255.2	304			
DCP					Note 33
* * * * *					
62. Silver—Total [28], mg/L: Digestion [3] followed by:					
AA direct aspiration	272.1	303 A or B		I-3720-84	33.089 [2], p. 37.[9]
AA furnace,	272.2	304			
Colorimetric (Dithizone), or					319B.[10]
ICP, or					200.7.[4]
DCP					Note 33
63. Sodium—Total [3], mg/L: Digestion [3] followed by:					
AA direct aspiration,	273.1	303A		I-3735-84	33.107.[2]
ICP					200.7.[4]
DCP, or					Note 33
Flame photometric		325B	D1428-82(A)		
* * * * *					

TABLE IB.—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter, units and method	Reference (method number or page)				
	EPA 1979	Std. methods, 16th Ed.	ASTM	USGS [1]	Other
72. Titanium—Total [3], mg/L: Digestion [3] followed by:					
AA direct aspiration	283.1	303C			
AA furnace	283.2	304			
DCP					Note 33
* * * * *					
74. Vanadium, Total [3], mg/L: Digestion [3] followed by:					
AA direct aspiration	286.1	303C			
AA furnace	286.2	304			
ICP					200.7.[4]
DCP, or					Note 33
Colorimetric (Gallic acid)		327B	D3373-84(A)		
75. Zinc-Total [3], mg/L: Digestion [3] followed by:					
AA direct aspiration	289.1	303A or B	D1691-84 (C or D)	I-3900-84	33.089 [3], p. 37.[9]
AA furnace	289.2	304			
ICP					200.7.[4]
DCP, or					Note 33
Colorimetric (Dithizone) or (Zincon)		328C			Note 32.
* * * * *					

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[33] "Direct Current Plasma (DCP) Optical Emission Spectrometric Method for Trace Elemental Analysis of Water and Wastes, Method AES0029," 1986. Beckman Instruments, Inc., Campus Drive at Jamboree Boulevard, Irvine, CA 97213.

§ 136.4 Application for alternate test procedures.

(a) Any person may apply to the Regional Administrator in the Region where the discharge occurs for approval of an alternative test procedure.

(b) When the discharge for which an alternative test procedure is proposed occurs within a State having a permit program approved pursuant to section 402 of the Act, the applicant shall submit his application to the Regional Administrator through the Director of the State agency having responsibility for issuance of NPDES permits within such State.

(c) Unless and until printed application forms are made available, an application for an alternate test procedure may be made by letter in triplicate. Any application for an alternate test procedure under this paragraph (c) shall:

(1) Provide the name and address of the responsible person or firm making the discharge (if not the applicant) and the applicable ID number of the existing or pending permit, issuing agency, and type of permit for which the alternate test procedure is requested, and the discharge serial number.

(2) Identify the pollutant or parameter for which approval of an alternate testing procedure is being requested.

(3) Provide justification for using testing procedures other than those specified in Table I.

(4) Provide a detailed description of he proposed alternate test procedure, ogether with references to published tudies of the applicability of the alernate test procedure to the effluents n question.

(d) An application for approval of an lternate test procedure for nationide use may be made by letter in tripcate to the Director, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268. Any applicaion for an alternate test procedure nder this paragraph (d) shall:

(1) Provide the name and address of he responsible person or firm making he application.

(2) Identify the pollutant(s) or arameter(s) for which nationwide aproval of an alternate testing proceure is being requested.

(3) Provide a detailed description of the proposed alternate procedure, together with references to published or other studies confirming the general applicability of the alternate test procedure to the pollutant(s) or parameter(s) in waste water discharges from representative and specified industrial or other categories.

(4) Provide comparability data for the performance of the proposed alternate test procedure compared to the performance of the approved test procedures.

[38 FR 28760, Oct. 16, 1973, as amended at 41 FR 52785, Dec. 1, 1976]

§ 136.5 Approval of alternate test procedures.

(a) The Regional Administrator of the region in which the discharge will occur has final responsibility for approval of any alternate test procedure proposed by the responsible person or firm making the discharge.

(b) Within thirty days of receipt of an application, the Director will forward such application proposed by the responsible person or firm making the discharge, together with his recommendations, to the Regional Administrator. Where the Director recommends rejection of the application for scientific and technical reasons which he provides, the Regional Administrator shall deny the application, and shall forward a copy of the rejected application and his decision to the Director of the State Permit Program and to the Director of the Environmental Monitoring and Support Laboratory, Cincinnati.

(c) Before approving any application for an alternate test procedure proposed by the responsible person or firm making the discharge, the Regional Administrator shall forward a copy of the application to the Director of the Environmental Monitoring and Support Laboratory, Cincinnati.

(d) Within ninety days of receipt by the Regional Administrator of an application for an alternate test procedure, proposed by the responsible person or firm making the discharge, the Regional Administrator shall notify the applicant and the appropriate State agency of approval or rejection, or shall specify the additional information which is required to determine whether to approve the proposed test procedure. Prior to the expiration of such ninety day period, a recommendation providing the scientific and other technical basis for acceptance or rejection will be forwarded to the Regional Administrator by the Director of the Environmental Monitoring and Support Laboratory, Cincinnati. A copy of all approval and rejection notifications will be forwarded to the Director, Environmental Monitoring and Support Laboratory, Cincinnati, for the purposes of national coordination.

(e) Within ninety days of the receipt by the Director of the Environmental Monitoring and Support Laboratory, Cincinnati of an application for an alternate test procedure for nationwide use, the Director of the Environmental Monitoring and Support Laboratory, Cincinnati shall notify the applicant of his recommendation to the Administrator to approve or reject the application, or shall specify additional information which is required to determine whether to approve the proposed test procedure. After such notification, an alternate method determined by the Administrator to satisfy the applicable requirements of this part shall be approved for nationwide use to satisfy the requirements of this subchapter; alternate test procedures determined by the Administrator not to meet the applicable requirements of this part shall be rejected. Notice of these determinations shall be submitted for publication in the FEDERAL REGISTER not later than 15 days after such notification and determination is made.

[38 FR 28760, Oct. 16, 1973, as amended at 41 FR 52785, Dec. 1, 1976]

APPENDIX A TO PART 136—METHODS FOR ORGANIC CHEMICAL ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER

METHOD 601—PURGEABLE HALOCARBONS

1. Scope and Application

1.1 This method covers the determination of 29 purgeable halocarbons.

The following parameters may be determined by this method:

Parameter	STORET No.	CAS No.
Bromodichloromethane	32101	75-27-4
Bromoform †D32104	75-25-2	
Bromomethane	34413	74-83-9
Carbon tetrachloride	32102	56-23-5
Chlorobenzene	34301	108-90-7
Chloroethane	34311	75-00-3
2-Chloroethylvinyl ether	34576	100-75-8
Chloroform	32106	67-66-3
Chloromethane	34418	74-87-3
Dibromochloromethane	32105	124-48-1
1,2-Dichlorobenzene	34536	95-50-1
1,3-Dichlorobenzene	34566	541-73-1
1,4-Dichlorobenzene	34571	106-46-7
Dichlorodifluoromethane	34668	75-71-8
1,1-Dichloroethane	34496	75-34-3
1,2-Dichloroethane	34531	107-06-2
1,1-Dichloroethane	34501	75-35-4
trans-1,2-Dichloroethene	34546	156-60-5
1,2-Dichloropropane	34541	78-87-5
cis-1,3-Dichloropropene	34704	10061-01-5
trans-1,3-Dichloropropene	34699	10061-02-6
Methylene chloride	34423	75-09-2
1,1,2,2-Tetrachloroethane	34516	79-34-5
Tetrachloroethene	34475	127-18-4
1,1,1-Trichloroethane	34506	71-55-6
1,1,2-Trichloroethane	34511	79-00-5
Tetrachloroethene	39180	79-01-6
Trichlorofluoromethane	34488	75-69-4
Vinyl chloride	39715	75-01-4

1.2 This is a purge and trap gas chromatographic (GC) method applicable to the determination of the compounds listed above in municipal and industrial discharges as provided under 40 CFR 136.1. When this method is used to analyze unfamiliar samples for any or all of the compounds above, compound identifications should be supported by at least one additional qualitative technique. This method describes analytical conditions for a second gas chromatographic column that can be used to confirm measurements made with the primary column. Method 624 provides gas chromatograph/mass spectrometer (GC/MS) conditions appropriate for the qualitative and quantitative confirmation of results for most of the parameters listed above.

1.3 The method detection limit (MDL defined in Section 12.1)[1] for each parameter is listed in Table 1. The MDL for a specific wastewater may differ from those listed, depending upon the nature of interferences in the sample matrix.

1.4 Any modification of this method beyond those expressly permitted, shall be considered as a major modification subject to application and approval of alternate test procedures under 40 CFR 136.4 and 136.5.

1.5 This method is restricted to use by or under the supervision of analysts experienced in the operation of a purge and trap system and a gas chromatograph and in the interpretation of gas chromatograms. Each analyst must demonstrate the ability to generate acceptable results with this method using the procedure described in Section 8.2.

2. Summary of Method

2.1 An inert gas is bubbled through a 5-mL water sample contained in a specially-designed purging chamber at ambient temperature. The halocarbons are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent trap where the halocarbons are trapped. After purging is completed, the trap is heated and backflushed with the inert gas to desorb the halocarbons onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the halocarbons which are then detected with a halide-specific detector.[2,3]

2.2 The method provides an optional gas chromatographic column that may be helpful in resolving the compounds of interest from interferences that may occur.

3. Interferences

3.1 Impurities in the purge gas and organic compounds outgassing from the plumbing ahead of the trap account for the majority of contamination problems. The analytical system must be demonstrated to be free from contamination under the conditions of the analysis by running laboratory reagent blanks as described in Section 8.1.3. The use of non-Teflon plastic tubing, non-Teflon thread sealants, or flow controllers with rubber components in the purge and trap system should be avoided.

3.2 Samples can be contaminated by diffusion of volatile organics (particularly fluorocarbons and methylene chloride) through the septum seal ilto the sample during shipment and storage. A field reagent blank prepared from reagent water and carried through the sampling and handling protocol can serve as a check on such contamination.

3.3 Contamination by carry-over can occur whenever high level and low level amples are sequentially analyzed. To educe carry-over, the purging device and ample syringe must be rinsed with reagent water between sample analyses. Whenever n unusually concentrated sample is encountered, it should be followed by an analysis of reagent water to check for cross contamination. For samples containing large mounts of water-soluble materials, suspended solids, high boiling compounds or igh organohalide levels, it may be necessary to wash out the purging device with a etergent solution, rinse it with distilled ater, and then dry it in a 105°C oven beween analyses. The trap and other parts of he system are also subject to contamination; therefore, frequent bakeout and purging of the entire system may be required.

4. Safety

4.1 The toxicity or carcinogenicity of each reagent used in this method has not been precisely defined; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material data handling sheets should also be made available to all personnel involved in the chemical analysis. Additional references to laboratory safety are available and have been identified [4,6] for the information of the analyst.

4.2 The following parameters covered by this method have been tentatively classified as known or suspected, human or mammalian carcinogens: carbon tetrachloride, chloroform, 1,4-dichlorobenzene, and vinyl chloride. Primary standards of these toxic compounds should be prepared in a hood. A NIOSH/MESA approved toxic gas respirator should be worn when the analyst handles high concentrations of these toxic compounds.

5. Apparatus and Materials

5.1 Sampling equipment, for discrete sampling.

5.1.1 Vial—25-mL capacity or larger, equipped with a screw cap with a hole in the center (Pierce #13075 or equivalent). Detergent wash, rinse with tap and distilled water, and dry at 105 °C before use.

5.1.2 Septum—Teflon-faced silicone (Pierce #12722 or equivalent). Detergent wash, rinse with tap and distilled water, and dry at 105 °C for 1 h before use.

5.2 Purge and trap system—The purge and trap system consists of three separate pieces of equipment: a purging device, trap, and desorber. Several complete systems are now commercially available.

5.2.1 The purging device must be designed to accept 5-mL samples with a water column at least 3 cm deep. The gaseous head space between the water column and the trap must have a total volume of less than 15 mL. The purge gas must pass through the water column as finely divided bubbles with a diameter of less than 3 mm at the origin. The purge gas must be introduced no more than 5 mm from the base of the water column. The purging device illustrated in Figure 1 meets these design criteria.

5.2.2 The trap must be at least 25 cm long and have an inside diameter of at least 0.105 in. The trap must be packed to contain the following minimum lengths of adsorbents: 1.0 cm of methyl silicone coated packing (Section 6.3.3), 7.7 cm of 2,6-diphenylene oxide polymer (Section 6.3.2), 7.7 cm of silica gel (Section 6.3.4), 7.7 cm of coconut charcoal (Section 6.3.1). If it is not necessary to analyze for dichlorodifluoromethane, the charcoal can be eliminated, and the polymer section lengthened to 15 cm. The minimum specifications for the trap are illustrated in Figure 2.

5.2.3 The desorber must be capable of rapidly heating the trap to 180 °C. The polymer section of the trap should not be heated higher than 180 °C and the remaining sections should not exceed 200 °C. The desorber illustrated in Figure 2 meets these design criteria.

5.2.4 The purge and trap system may be assembled as a separate unit or be coupled to a gas chromatograph as illustrated in Figures 3 and 4.

5.3 Gas chromatograph—An analytical system complete with a temperature programmable gas chromatograph suitable for on-column injection and all required accessories including syringes, analytical columns, gases, detector, and strip-chart recorder. A data system is recommended for measuring peak areas.

5.3.1 Column 1—8 ft long x 0.1 in. ID stainless steel or glass, packed with 1% SP-1000 on Carbopack B (60/80 mesh) or equivalent. This column was used to develop the method performance statements in Section 12. Guidelines for the use of alternate column packings are provided in Section 10.1.

5.3.2 Column 2—6 ft long x 0.1 in. ID stainless steel or glass, packed with chemically bonded n-octane on Porasil-C (100/120 mesh) or equivalent.

5.3.3 Detector—Electrolytic conductivity or microcoulometric detector. These types of detectors have proven effective in the analysis of wastewaters for the parameters listed in the scope (Section 1.1). The electrolytic conductivity detector was used to develop the method performance statements in Section 12. Guidelines for the use of alternate detectors are provided in Section 10.1.

5.4 Syringes—5-mL glass hypodermic with Luerlok tip (two each), if applicable to the purging device.

5.5 Micro syringes—25-μL, 0.006 in. ID needle.

5.6 Syringe valve—2-way, with Luer ends (three each).

5.7 Syringe—5-mL, gas-tight with shut-off valve.

5.8 Bottle—15-mL, screw-cap, with Teflon cap liner.

5.9 Balance—Analytical, capable of accurately weighing 0.0001 g.

6. Reagents

6.1 Reagent water—Reagent water is defined as a water in which an interferent i not observed at the MDL of the parameter of interest.

6.1.1 Reagent water can be generated b passing tap water through a carbon filte bed containing about 1 lb of activate carbon (Filtrasorb-300, Calgon Corp., o equivalent).

6.1.2 A water purification system (Millipore Super-Q or equivalent) may be used t generate reagent water.

6.1.3 Reagent water may also be prepared by boiling water for 15 min. Subsequently, while maintaining the temperatur at 90 °C, bubble a contaminant-free iner gas through the water for 1 h. While stil hot, transfer the water to a narrow mout screw-cap bottle and seal with a Teflon-lined septum and cap.

6.2 Sodium thiosulfate—(ACS) Granular.

6.3 Trap Materials:

6.3.1 Coconut charcoal—6/10 mesh sieved to 26 mesh, Barnabey Cheney, CA-580-2 lot # M-2649 or equivalent.

6.3.2 2,6-Diphenylene oxide polymer—Tenax, (60/80 mesh), chromatographic grade or equivalent.

6.3.3 Methyl silicone packing—3% OV-1 on Chromosorb-W (60/80 mesh) or equivalent.

6.3.4 Silica gel—35/60 mesh, Davison, grade-15 or equivalent.

6.4 Methanol—Pesticide quality or equivalent.

6.5 Stock standard solutions—Stock standard solutions may be prepared from pure standard materials or purchased as certified solutions. Prepare stock standard solutions in methanol using assayed liquids or gases as appropriate. Because of the toxicity of some of the organohalides, primary dilutions of these materials should be prepared in a hood. A NIOSH/MESA approved toxic gas respirator should be used when the analyst handles high concentrations of such materials.

6.5.1 Place about 9.8 mL of methanol into a 10-mL ground glass stoppered volumetric flask. Allow the flask to stand, unstoppered, for about 10 min or until all alcohol wetted surfaces have dried. Weigh the flask to the learest 0.1 mg.

6.5.2 Add the assayed reference material:

6.5.2.1 Liquid—Using a 100 μL syringe, immediately add two or more drops of assayed reference material to the flask, then reweigh. Be sure that the drops fall directly into the alcohol without contacting the neck of the flask.

6.5.2.2 Gases—To prepare standards for any of the six halocarbons that boil below

30 °C (bromomethane, chloroethane, chloromethane, dichlorodifluoromethane, trichlorofluoromethane, vinyl chloride), fill a 5-mL valved gas-tight syringe with the reference standard to the 5.0-mL mark. Lower the needle to 5 mm above the methanol meniscus. Slowly introduce the reference standard above the surface of the liquid (the heavy gas will rapidly dissolve into the methanol).

6.5.3 Reweigh, dilute to volume, stopper, then mix by inverting the flask several times. Calculate the concentration in μg/μL from the net gain in weight. When compound purity is assayed to be 96% or greater, the weight can be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards can be used at any concentration if they are certified by the malufacturer or by an independent source.

6.5.4 Transfer the stock standard solution into a Teflon-sealed screw-cap bottle. Store, with minimal headspace, at −10 to −20 °C and protect from light.

6.5.5 Prepare fresh standards weekly for the six gases and 2-chloroethylvinyl ether. All other standards must be replaced after one month, or sooner if comparison with check standards indicates a problem.

6.6 Secondary dilution standards—Using stock standard solutions, prepare secondary dilution standards in methanol that contain the compounds of interest, either singly or mixed together. The secondary dilution standards should be prepared at concentrations such that the aqueous calibration standards prepared in Section 7.3.1 or 7.4.1 will bracket the working range of the analytical system. Secondary dilution standards should be stored with minimal headspace and should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

6.7 Quality control check sample concentrate—See Section 8.2.1.

7. Calibration

7.1 Assemble a purge and trap system that meets the specifications in Section 5.2. Condition the trap overnight at 180 °C by backflushing with an inert gas flow of at least 20 mL/min. Condition the trap for 10 min once daily prior to use.

7.2 Connect the purge and trap system to a gas chromatograph. The gas chromatograph must be operated using temperature and flow rate conditions equivalent to those given in Table 1. Calibrate the purge and trap-gas chromatographic system using either the external standard technique (Section 7.3) or the internal standard technique (Section 7.4).

7.3 External standard calibration procedure:

7.3.1 Prepare calibration standards at a miminum of three concentration levels for each parameter by carefully adding 20.0 μL of one or more secondary dilution standards to 100, 500, or 1000 mL of reagent water. A 25-μL syringe with a 0.006 in. ID needle should be used for this operation. One of the external standards should be at a concentration near, but above, the MDL (Table 1) and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the detector. These aqueous standards can be stored up to 24 h, if held in sealed vials with zero headspace as described in Section 9.2. If not so stored, they must be discarded after 1 h.

7.3.2 Analyze each calibration standard according to Section 10, and tabulate peak height or area responses versus the concentration in the standard. The results can be used to prepare a calibration curve for each compound. Alternatively, if the ratio of response to concentration (calibration factor) is a constant over the working range (<10% relative standard deviation, RSD), linearity through the origin can be assumed and the average ratio or calibration factor can be used in place of a calibration curve.

7.4 Internal standard calibration procedure—To use this approach, the analyst must select one or more internal standards that are similar in analytical behavior to the compounds of interest. The analyst must further demonstrate that the measurement of the internal standard is not affected by method or matrix interferences. Because of these limitations, no internal standard can be suggested that is applicable to all samples. The compounds recommended for use as surrogate spikes in Section 8.7 have been used successfully as internal standards, because of their generally unique retention times.

7.4.1 Prepare calibration standards at a minimum of three concentration levels for each parameter of interest as described in Section 7.3.1.

7.4.2 Prepare a spiking solution containing each of the internal standards using the procedures described in Sections 6.5 and 6.6. It is recommended that the secondary dilution standard be prepared at a concentration of 15 μg/mL of each internal standard compound. The addition of 10 μL of this standard to 5.0 mL of sample or calibration standard would be equivalent to 30 μg/L.

7.4.3 Analyze each calibration standard according to Section 10, adding 10 μL of internal standard spiking solution directly to the syringe (Section 10.4). Tabulate peak height or area responses against concentration for each compound and internal standard, and calculate response factors (RF) for each compound using Equation 1.

$$RF = \frac{(A_s)(C_{is})}{(A_{is})(C_s)}$$

Equation 1

where:

A_s=Response for the parameter to be measured.

A_{is}=Response for the internal standard.

C_{is}=Concentration of the internal standard.

C_s=Concentration of the parameter to be measured.

If the RF value over the working range is a constant (<10% RSD), the RF can be assumed to be invariant and the average RF can be used for calculations. Alternatively, the results can be used to plot a calibration curve of response ratios, A_s/A_{is}, vs. RF.

7.5 The working calibration curve, calibration factor, or RF must be verified on each working day by the measurement of a QC check sample.

7.5.1 Prepare the QC check sample as described in Section 8.2.2.

7.5.2 Analyze the QC check sample according to Section 10.

7.5.3 For each parameter, compare the response (Q) with the corresponding calibration acceptance criteria found in Table 2. If the responses for all parameters of interest fall within the designated ranges, analysis of actual samples can begin. If any individual Q falls outside the range, proceed according to Section 7.5.4.

NOTE: The large number of parameters in Table 2 present a substantial probability that one or more will not meet the calibration acceptance criteria when all parameters are analyzed.

7.5.4 Repeat the test only for those parameters that failed to meet the calibration acceptance criteria. If the response for a parameter does not fall within the range in this second test, a new calibration curve, calibration factor, or RF must be prepared for that parameter according to Section 7.3 or 7.4.

8. Quality Control

8.1 Each laboratory that uses this method is required to operate a formal quality control program. The minimum requirements of this program consist of an initial demonstration of laboratory capability and an ongoing analysis of spiked samples to evaluate and document data quality. The laboratory must maintain records to document the quality of data that is generated. Ongoing data quality checks are compared with established performance criteria to determine if the results of analyses meet the performance characteristics of the method. When results of sample spikes indicate atypical method performance, a quality control check standard must be analyzed to confirm that the measurements were performed in an in-control mode of operation.

8.1.1 The analyst must make an initial, one-time, demonstration of the ability to generate acceptable accuracy and precision with this method. This ability is established as described in Section 8.2.

8.1.2 In recognition of advances that are occurring in chromatography, the analyst is permitted certain options (detailed in Section 10.1) to improve the separations or lower the cost of measurements. Each time such a modification is made to the method, the analyst is required to repeat the procedure in Section 8.2.

8.1.3 Each day, the analyst must analyze a reagent water blank to demonstrate that interferences from the analytical system are under control.

8.1.4 The laboratory must, on an ongoing basis, spike and analyze a minimum of 10% of all samples to monitor and evaluate laboratory data quality. This procedure is described in Section 8.3.

8.1.5 The laboratory must, on an ongoing basis, demonstrate through the analyses of quality control check standards that the operation of the measurement system is in control. This procedure is described in Section 8.4. The frequency of the check standard analyses is equivalent to 10% of all samples analyzed but may be reduced if spike recoveries from samples (Section 8.3) meet all specified quality control criteria.

8.1.6 The laboratory must maintain performance records to document the quality of data that is generated. This procedure is described in Section 8.5.

8.2 To establish the ability to generate acceptable accuracy and precision, the analyst must perform the following operations.

8.2.1 A quality control (QC) check sample concentrate is required containing each parameter of interest at a concentration of 10 μg/mL in methanol. The QC check sample concentrate must be obtained from the U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory in Cincinnati, Ohio, if available. If not available from that source, the QC check sample concentrate must be obtained from another external source. If not available from either source above, the QC check sample concentrate must be prepared by the laboratory using stock standards prepared independently from those used for calibration.

8.2.2 Prepare a QC check sample to contain 20 μg/L of each parameter by adding 200 μL of QC check sample concentrate to 100 mL of reagent water.

8.2.3 Analyze four 5-mL aliquots of the well-mixed QC check sample according to Section 10.

8.2.4 Calculate the average recovery ($\bar{X}$) in µg/L, and the standard deviation of the recovery (s) in µg/L, for each parameter of interest using the four results.

8.2.5 For each parameter compare s and $\bar{X}$ with the corresponding acceptance criteria for precision and accuracy, respectively, found in Table 2. If s and $\bar{X}$ for all parameters of interest meet the acceptance criteria, the system performance is acceptable and analysis of actual samples can begin. If any individual s exceeds the precision limit or any individual $\bar{X}$ falls outside the range for accuracy, then the system performance is unacceptable for that parameter.

NOTE: The large number of parameters in Table 2 present a substantial probability that one or more will fail at least one of the acceptance criteria when all parameters are analyzed.

8.2.6 When one or more of the parameters tested fail at least one of the acceptance criteria, the analyst must proceed according to Section 8.2.6.1 or 8.2.6.2.

8.2.6.1 Locate and correct the source of the problem and repeat the test for all parameters of interest beginning with Section 8.2.3.

8.2.6.2 Beginning with Section 8.2.3, repeat the test only for those parameters that failed to meet criteria. Repeated failure, however, will confirm a general problem with the measurement system. If this occurs, locate and correct the source of the problem and repeat the test for all compounds of interest beginning with Section 8.2.3.

8.3 The laboratory must, on an ongoing basis, spike at least 10% of the samples from each sample site being monitored to assess accuracy. For laboratories analyzing one to ten samples per month, at least one spiked sample per month is required.

8.3.1 The concentration of the spike in the sample should be determined as follows:

8.3.1.1 If, as in compliance monitoring, the concentration of a specific parameter in the sample is being checked against a regulatory concentration limit, the spike should be at that limit or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.2 If the concentration of a specific parameter in the sample is not being checked against a limit specific to that parameter, the spike should be at 20 µg/L or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.2 Analyze one 5-mL sample aliquot to determine the background concentration (B) of each parameter. If necessary, prepare a new QC check sample concentrate (Section 8.2.1) appropriate for the background concentrations in the sample. Spike a second 5-mL sample aliquot with 10 µL of the QC check sample concentrate and analyze it to determine the concentration after spiking (A) of each parameter. Calculate each percent recovery (P) as 100(A-B)%/T, where T is the known true value of the spike.

8.3.3 Compare the percent recovery (P) for each parameter with the corresponding QC acceptance criteria found in Table 2. These acceptance criteria were calculated to include an allowance for error in measurement of both the background and spike concentrations, assuming a spike to background ratio of 5:1. This error will be accounted for to the extent that the analyst's spike to background ratio approaches 5:1.[7] If spiking was performed at a concentration lower than 20 µg/L, the analyst must use either the QC acceptance criteria in Table 2, or optional QC acceptance criteria calculated for the specific spike concentration. To calculate optional acceptance criteria for the recovery of a parameter: (1) Calculate accuracy (X') using the equation in Table 3, substituting the spike concentration (T) for C; (2) calculate overall precision (S') using the equation in Table 3, substituting X' for $\bar{X}$ (3) calculate the range for recovery at the spike concentration as $(100\ X'/T) \pm 2.44(100\ S'/T)\%$.[7]

8.3.4 If any individual P falls outside the designated range for recovery, that parameter has failed the acceptance criteria. A check standard containing each parameter that failed the criteria must be analyzed as described in Section 8.4.

8.4 If any parameter fails the acceptance criteria for recovery in Section 8.3, a QC check standard containing each parameter that failed must be prepared and analyzed.

NOTE: The frequency for the required analysis of a QC check standard will depend upon the number of parameters being simultaneously tested, the complexity of the sample matrix, and the performance of the laboratory. If the entire list of parameters in Table 2 must be measured in the sample in Section 8.3, the probability that the analysis of a QC check standard will be required is high. In this case the QC check standard should be routinely analyzed with the spiked sample.

8.4.1 Prepare the QC check standard by adding 10 µL of QC check sample concentrate (Section 8.2.1 or 8.3.2) to 5 mL of reagent water. The QC check standard needs only to contain the parameters that failed criteria in the test in Section 8.3.

8.4.2 Analyze the QC check standard to determine the concentration measured (A) of each parameter. Calculate each percent recovery (P_s) as 100 (A/T)%, where T is the true value of the standard concentration.

8.4.3 Compare the percent recovery (P_s) for each parameter with the corresponding QC acceptance criteria found in Table 2.

Only parameters that failed the test in Section 8.3 need to be compared with these criteria. If the recovery of any such parameter falls outside the designated range, the laboratory performance for that parameter is judged to be out of control, and the problem must be immediately identified and corrected. The analytical result for that parameter in the unspiked sample is suspect and may not be reported for regulatory compliance purposes.

8.5 As part of the QC program for the laboratory, method accuracy for wastewater samples must be assessed and records must be maintained. After the analysis of five spiked wastewater samples as in Section 8.3, calculate the average percent recovery ($\bar{P}$) and the standard deviation of the percent recovery (s_p). Express the accuracy assessment as a percent recovery interval from $\bar{P}-2s_p$ to $\bar{P}+2s_p$. If $\bar{p}=90\%$ and $s_p=10\%$, for example, the accuracy interval is expressed as 70–110%. Update the accuracy assessment for each parameter on a regular basis (e.g. after each five to ten new accuracy measurements).

8.6 It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Field duplicates may be analyzed to assess the precision of the environmental measurements. When doubt exists over the identification of a peak on the chromatogram, confirmatory techniques such as gas chromatography with a dissimilar column, specific element detector, or mass spectrometer must be used. Whenever possible, the laboratory should analyze standard reference materials and participate in relevant performance evaluation studies.

8.7 The analyst should monitor both the performance of the analytical system and the effectiveness of the method in dealing with each sample matrix by spiking each sample, standard, and reagent water blank with surrogate halocarbons. A combination of bromochloromethane, 2-bromo-1-chloropropane, and 1,4-dichlorobutane is recommended to encompass the range of the temperature program used in this method. From stock standard solutions prepared as in Section 6.5, add a volume to give 750 μg of each surrogate to 45 mL of reagent water contained in a 50-mL volumetric flask, mix and dilute to volume for a concentration of 15 ng/μL. Add 10 μL of this surrogate spiking solution directly into the 5-mL syringe with every sample and reference standard analyzed. Prepare a fresh surrogate spiking solution on a weekly basis. If the internal standard calibration procedure is being used, the surrogate compounds may be added directly to the internal standard spiking solution (Section 7.4.2).

9. Sample Collection, Preservation, and Handling

9.1 All samples must be iced or refrig ated from the time of collection until analy sis. If the sample contains free or combine chlorine, add sodium thiosulfate preserv tive (10 mg/40 mL is sufficient for up to ppm Cl_2) to the empty sample bottle ju prior to shipping to the sampling site. EP Methods 330.4 and 330.5 may be used fo measurement of residual chlorine.[8] Fiel test kits are available for this purpose.

9.2 Grab samples must be collected i glass containers having a total volume of least 25 mL. Fill the sample bottle just t overflowing in such a manner that no ai bubbles pass through the sample as th bottle is being filled. Seal the bottle so tha no air bubbles are entrapped in it. If pre servative has been added, shake vigorousl for 1 min. Maintain the hermetic seal on th sample bottle until time of analysis.

9.3 All samples must be analyzed withi 14 days of collection.[3]

10. Procedure

10.1 Table 1 summarizes the recommend ed operating conditions for the gas chro matograph. Included in this table are esti mated retention times and MDL that can b achieved under these conditions. An exam ple of the separations achieved by Column is shown in Figure 5. Other packed columns chromatographic conditions, or detector may be used if the requirements of Section 8.2 are met.

10.2 Calibrate the system daily as de scribed in Section 7.

10.3 Adjust the purge gas (nitrogen o helium) flow rate to 40 mL/min. Attach the trap inlet to the purging device, and set the purge and trap system to purge (Figure 3). Open the syringe valve located on the purg ing device sample introduction needle.

10.4 Allow the sample to come to ambi ent temperature prior to introducing it to the syringe. Remove the plunger from a 5- mL syringe and attach a closed syringe valve. Open the sample bottle (or standard) and carefully pour the sample into the sy ringe barrel to just short of overflowing. Re place the syringe plunger and compress the sample. Open the syringe valve and vent any residual air while adjusting the sample volume to 5.0 mL. Since this process of taking an aliquot destroys the validity of the sample for future analysis, the analyst should fill a second syringe at this time to protect against possible loss of data. Add 10.0 μL of the surrogate spiking solution (Section 8.7) and 10.0 μL of the internal standard spiking solution (Section 7.4.2), if applicable, through the valve bore, then close the valve.

10.5 Attach the syringe-syringe valve assembly to the syringe valve on the purging device. Open the syringe valves and inject the sample into the purging chamber.

10.6 Close both valves and purge the sample for 11.0±0.1 min at ambient temperature.

10.7 After the 11-min purge time, attach the trap to the chromatograph, adjust the purge and trap system to the desorb mode (Figure 4), and begin to temperature program the gas chromatograph. Introduce the trapped materials to the GC column by rapidly heating the trap to 180 °C while backflushing the trap with an inert gas between 20 and 60 mL/min for 4 min. If rapid heating of the trap cannot be achieved, the GC column must be used as a secondary trap by cooling it to 30 °C (subambient temperature, if poor peak geometry or random retention time problems persist) instead of the initial program temperature of 45 °C

10.8 While the trap is being desorbed into the gas chromatograph, empty the purging chamber using the sample introduction syringe. Wash the chamber with two 5-mL flushes of reagent water.

10.9 After desorbing the sample for 4 min, recondition the trap by returning the purge and trap system to the purge mode. Wait 15 s then close the syringe valve on the purging device to begin gas flow through the trap. The trap temperature should be maintained at 180 °C After approximately 7 min, turn off the trap heater and open the syringe valve to stop the gas flow through the trap. When the trap is cool, the next sample can be analyzed.

10.10 Identify the parameters in the sample by comparing the retention times of the peaks in the sample chromatogram with those of the peaks in standard chromatograms. The width of the retention time window used to make identifications should be based upon measurements of actual retention time variations of standards over the course of a day. Three times the standard deviation of a retention time for a compound can be used to calculate a suggested window size; however, the experience of the analyst should weigh heavily in the interpretation of chromatograms.

10.11 If the response for a peak exceeds the working range of the system, prepare a dilution of the sample with reagent water from the aliquot in the second syringe and reanalyze.

11. Calculations

11.1 Determine the concentration of individual compounds in the sample.

11.1.1 If the external standard calibration procedure is used, calculate the concentration of the parameter being measured from the peak response using the calibration curve or calibration factor determined in Section 7.3.2.

11.1.2 If the internal standard calibration procedure is used, calculate the concentration in the sample using the response factor (RF) determined in Section 7.4.3 and Equation 2.

Equation 2

$$\text{Concentration } (\mu g/L) = \frac{(A_s)(C_{is})}{(A_{is})(RF)}$$

where:

A_s=Response for the parameter to be measured.

A_{is}=Response for the internal standard.

C_{is}=Concentration of the internal standard.

11.2 Report results in μg/L without correction for recovery data. All QC data obtained should be reported with the sample results.

12. Method Performance

12.1 The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero.[1] The MDL concentration listed in Table 1 were obtained using reagent water.[11]. Similar results were achieved using representative wastewaters. The MDL actually achieved in a given analysis will vary depending on instrument sensitivity and matrix effects.

12.2 This method is recommended for use in the concentration range from the MDL to 1000×MDL. Direct aqueous injection techniques should be used to measure concentration levels above 1000×MDL.

12.3 This method was tested by 20 laboratories using reagent water, drinking water, surface water, and three industrial wastewaters spiked at six concentrations over the range 8.0 to 500 μg/L.[9] Single operator precision, overall precision, and method accuracy were found to be directly related to the concentration of the parameter and essentially independent of the sample matrix. Linear equations to describe these relationships are presented in Table 3.

References

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TABLE 1.—CHROMATOGRAPHIC CONDITIONS AND METHOD DETECTION LIMITS

Parameter	Retention time (min)		Method detect limit (µg/L)
	Column 1	Column 2	
Chloromethane	1.50	5.28	0.08
Bromomethane	2.17	7.05	1.18
Dichlorodifluoromethane	2.62	nd	1.81
Vinyl chloride	2.67	5.28	0.18
Chloroethane	3.33	8.68	0.52
Methylene chloride	5.25	10.1	0.25
Trichlorofluoromethane	7.18	nd	nd
1,1-Dichloroethene	7.93	7.72	0.13
1,1-Dichloroethane	9.30	12.6	0.07
trans-1,2-Dichloroethene	10.1	9.38	0.10
Chloroform	10.7	12.1	0.05
1,2-Dichloroethane	11.4	15.4	0.03
1,1,1-Trichloroethane	12.6	13.1	0.03
Carbon tetrachloride	13.0	14.4	0.12
Bromodichloromethane	13.7	14.6	0.10
1,2-Dichloropropane	14.9	16.6	0.04
cis-1,3-Dichloropropene	15.2	16.6	0.34
Trichloroethene	15.8	13.1	0.12
Dibromochloromethane	16.5	16.6	0.09
1,1,2-Trichloroethane	16.5	18.1	0.02
trans-1,3-Dichloropropene	16.5	18.0	0.20
2-Chloroethylvinyl ether	18.0	nd	0.13
Bromoform	19.2	19.2	0.20
1,1,2,2-Tetrachloroethane	21.6	nd	0.03
Tetrachloroethene	21.7	15.0	0.03
Chlorobenzene	24.2	18.8	0.25
1,3-Dichlorobenzene	34.0	22.4	0.32
1,2-Dichlorobenzene	34.9	23.5	0.15
1,4-Dichlorobenzene	35.4	22.3	0.24

Column * conditions: Carbopack B (60/80 mesh) coated with 1% SP-1000 packed in an 8 ft x 0.1 in. ID stainless steel glass column with helium carrier gas at 40 mL/min flow rate. Column temperature held at 45 °C for 3 min then programmed 8 °C/min to 220 °C and held for 15 min.

Column 2 conditions: Porisil-C (100/120 mesh) coated with n-octane packed in a 6 ft x 0.1 in. ID stainless steel or gla column with helium carrier gas at 40 mL/min flow rate. Column temperature held at 50 °C for 3 min then programmed at 6 °C min to 170 °C and held for 4 min.

nd=not determined.

TABLE 2.—CALIBRATION AND QC ACCEPTANCE CRITERIA—METHOD 601 [a]

Parameter	Range for Q (μg/L)	Limit for s (μg/L)	Range for $\bar{X}$ (μg/L)	Range P, P_s (%)
Bromodichloromethane	15.2–24.8	4.3	10.7–32.0	42–172
Bromoform	14.7–25.3	4.7	5.0–29.3	13–159
Bromomethane	11.7–28.3	7.6	3.4–24.5	D–144
Carbon tetrachloride	13.7–26.3	5.6	11.8–25.3	43–143
Chlorobenzene	14.4–25.6	5.0	10.2–27.4	38–150
Chloroethane	15.4–24.6	4.4	11.3–25.2	46–137
2-Chloroethylvinyl ether	12.0–28.0	8.3	4.5–35.5	14–186
Chloroform	15.0–25.0	4.5	12.4–24.0	49–133
Chloromethane	11.9–28.1	7.4	D–34.9	D–193
Dibromochloromethane	13.1–26.9	6.3	7.9–35.1	24–191
1,2-Dichlorobenzene	14.0–26.0	5.5	1.7–38.9	D–208
1,3-Dichlorobenzene	9.9–30.1	9.1	6.2–32.6	7–187
1,4-Dichlorobenzene	13.9–26.1	5.5	11.5–25.5	42–143
1,1-Dichloroethane	16.8–23.2	3.2	11.2–24.6	47–132
1,2-Dichloroethane	14.3–25.7	5.2	13.0–26.5	51–147
1,1-Dichloroethene	12.6–27.4	6.6	10.2–27.3	28–167
trans-1,2-Dichloroethene	12.8–27.2	6.4	11.4–27.1	38–155
1,2-Dichloropropane	14.8–25.2	5.2	10.1–29.9	44–156
cis-1,3-Dichloropropene	12.8–27.2	7.3	6.2–33.8	22–178
trans-1,3-Dichloropropene	12.8–27.2	7.3	6.2–33.8	22–178
Methylene chloride	15.5–24.5	4.0	7.0–27.6	25–162
1,1,2,2-Tetrachloroethane	9.8–30.2	9.2	6.6–31.8	8–184
Tetrachloroethene	14.0–26.0	5.4	8.1–29.6	26–162
1,1,1-Trichloroethane	14.2–25.8	4.9	10.8–24.8	41–138
1,1,2-Trichloroethane	15.7–24.3	3.9	9.6–25.4	39–136
Trichloroethene	15.4–24.6	4.2	9.2–26.6	35–146
Trichlorofluoromethane	13.3–26.7	6.0	7.4–28.1	21–156
Vinyl chloride	13.7–26.3	5.7	8.2–29.9	28–163

[a] Criteria were calculated assuming a QC check sample concentration of 20 μg/L.

Q=Concentration measured in QC check sample, in μg/L (Section 7.5.3).

s=Standard deviation of four recovery measurements, in μg/L (Section 8.2.4).

$\bar{X}$=Average recovery for four recovery measurements, in μg/L (Section 8.2.4).

P, P_s=Percent recovery measured (Section 8.3.2, Section 8.4.2).

D=Detected; result must be greater than zero.

NOTE: These criteria are based directly upon the method performance data in Table 3. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table 3.

TABLE 3.—METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION—METHOD 601

Parameter	Accuracy, as recovery, X′ (μg/L)	Single analyst precision, s_r' (μg/L)	Overall precision, S′ (μg/L)
Bromodichloromethane	1.12C−1.02	$0.11\bar{X}+0.04$	$0.20\bar{X}+1.00$
Bromoform	0.96C−2.05	$0.12\bar{X}+0.58$	$0.21\bar{X}+2.41$
Bromomethane	0.76C−1.27	$0.28\bar{X}+0.27$	$0.36\bar{X}+0.94$
Carbon tetrachloride	0.98C−1.04	$0.15\bar{X}+0.38$	$0.20\bar{X}+0.39$
Chlorobenzene	1.00C−1.23	$0.15\bar{X}-0.02$	$0.18\bar{X}+1.21$
Choroethane	0.99C−1.53	$0.14\bar{X}-0.13$	$0.17\bar{X}+0.63$
2-Chloroethylvinyl ether [a]	1.00C	$0.20\bar{X}$	$0.35\bar{X}$
Chloroform	0.93C−0.39	$0.13\bar{X}+0.15$	$0.19\bar{X}-0.02$
Chloromethane	0.77C+0.18	$0.28\bar{X}-0.31$	$0.52\bar{X}+1.31$
Dibromochloromethane	0.94C+2.72	$0.11\bar{X}+1.10$	$0.24\bar{X}+1.68$
1,2-Dichlorobenzene	0.93C+1.70	$0.20\bar{X}+0.97$	$0.13\bar{X}+6.13$
1,3-Dichlorobenzene	0.95C+0.43	$0.14\bar{X}+2.33$	$0.26\bar{X}+2.34$
1,4-Dichlorobenzene	0.93C−0.09	$0.15\bar{X}+0.29$	$0.20\bar{X}+0.41$
1,1-Dichloroethane	0.95C−1.08	$0.09\bar{X}+0.17$	$0.14\bar{X}+0.94$
1,2-Dichloroethane	1.04C−1.06	$0.11\bar{X}+0.70$	$0.15\bar{X}+0.94$
1,1-Dichloroethene	0.98C−0.87	$0.21\bar{X}-0.23$	$0.29\bar{X}-0.40$
trans-1,2-Dichloroethene	0.97C−0.16	$0.11\bar{X}+1.46$	$0.17\bar{X}+1.46$
1,2-Dichloropropane [a]	1.00C	$0.13\bar{X}$	$0.23\bar{X}$
cis-1,3-Dichloropropene [a]	1.00C	$0.18\bar{X}$	$0.32\bar{X}$
trans-1,3-Dichloropropene [a]	1.00C	$0.18\bar{X}$	$0.32\bar{X}$

TABLE 3.—METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION—METHOD 601—Continued

Parameter	Accuracy, as recovery, X' (µg/L)	Single analyst precision, s_r' (µg/L)	Overall precisio S' (µg/L)
Methylene chloride	0.91C−0.93	$0.11\bar{X}+0.33$	$0.21\bar{X}+1.43$
1,1,2,2-Tetrachloroethene	0.95C+0.19	$0.14\bar{X}+2.41$	$0.23\bar{X}+2.79$
Tetrachloroethene	0.94C+0.06	$0.14\bar{X}+0.38$	$0.18\bar{X}+2.21$
1,1,1-Trichloroethane	0.90C−0.16	$0.15\bar{X}+0.04$	$0.20\bar{X}+0.37$
1,1,2-Trichloroethane	0.86C+0.30	$0.13\bar{X}-0.14$	$0.19\bar{X}+0.67$
Trichloroethene	0.87C+0.48	$0.13\bar{X}-0.03$	$0.23\bar{X}+0.30$
Trichlorofluoromethane	0.89C−0.07	$0.15\bar{X}+0.67$	$0.26\bar{X}+0.91$
Vinyl chloride	0.97C−0.36	$0.13\bar{X}+0.65$	$0.27\bar{X}+0.40$

$\bar{X}'$ = Expected recovery for one or more measurements of a sample containing a concentration of C, in µg/L.
s_r' = Expected single analyst standard deviation of measurements at an average concentration found of $\bar{X}$, in µg/
S^1 = Expected interlaboratory standard deviation of measurements at an average concentration found of $\bar{X}$, in µg/
C = True value for the concentration, in µg/L.
$\bar{X}$ = Average recovery found for measurements of samples containing a concentration of C, in µg/L.
[a] Estimates based upon the performance in a single laboratory.[10]

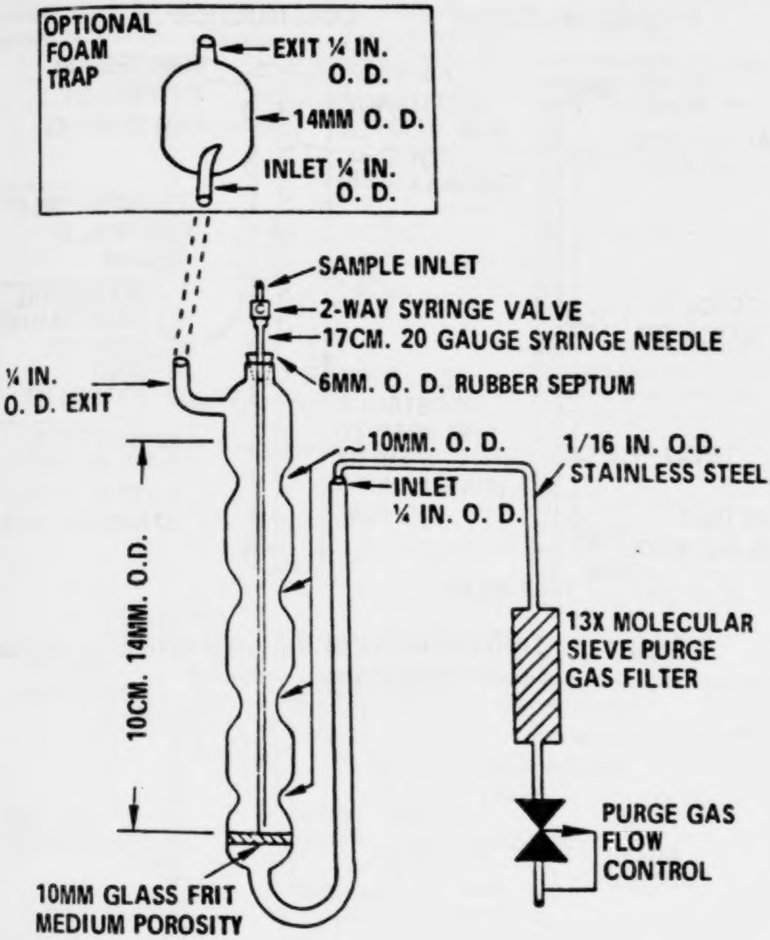
OPTIONAL FOAM TRAP
EXIT ¼ IN. O. D.
14MM O. D.
INLET ¼ IN. O. D.
SAMPLE INLET
2-WAY SYRINGE VALVE
17CM. 20 GAUGE SYRINGE NEEDLE
6MM. O. D. RUBBER SEPTUM
¼ IN. O. D. EXIT
10MM. O. D.
1/16 IN. O.D. STAINLESS STEEL
INLET ¼ IN. O. D.
10CM. 14MM. O.D.
13X MOLECULAR SIEVE PURGE GAS FILTER
PURGE GAS FLOW CONTROL
10MM GLASS FRIT MEDIUM POROSITY

Figure 1. Purging device.

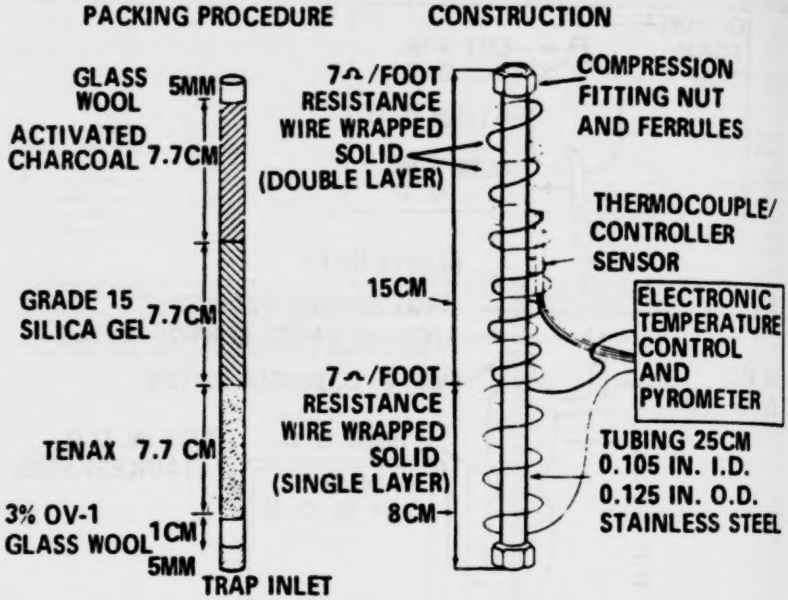
PACKING PROCEDURE
CONSTRUCTION
GLASS WOOL
5MM
ACTIVATED CHARCOAL
7.7CM
GRADE 15 SILICA GEL
7.7CM
TENAX
7.7 CM
3% OV-1
GLASS WOOL
1CM
5MM
TRAP INLET
7Ω/FOOT RESISTANCE WIRE WRAPPED SOLID (DOUBLE LAYER)
15CM
7Ω/FOOT RESISTANCE WIRE WRAPPED SOLID (SINGLE LAYER)
8CM
COMPRESSION FITTING NUT AND FERRULES
THERMOCOUPLE/ CONTROLLER SENSOR
ELECTRONIC TEMPERATURE CONTROL AND PYROMETER
TUBING 25CM 0.105 IN. I.D. 0.125 IN. O.D. STAINLESS STEEL

Figure 2. Trap packings and construction to include desorb capability

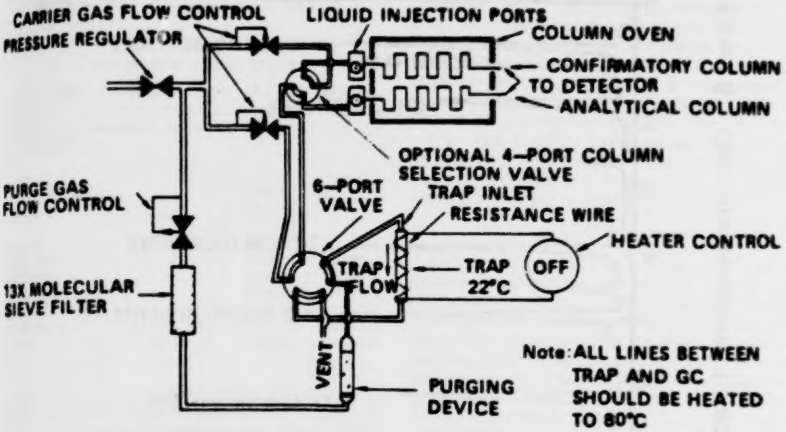
CARRIER GAS FLOW CONTROL
PRESSURE REGULATOR
LIQUID INJECTION PORTS
COLUMN OVEN
CONFIRMATORY COLUMN
TO DETECTOR
ANALYTICAL COLUMN
OPTIONAL 4–PORT COLUMN SELECTION VALVE
PURGE GAS FLOW CONTROL
6–PORT VALVE
TRAP INLET
RESISTANCE WIRE
HEATER CONTROL
TRAP FLOW
TRAP 22°C
OFF
13X MOLECULAR SIEVE FILTER
VENT
PURGING DEVICE
Note: ALL LINES BETWEEN TRAP AND GC SHOULD BE HEATED TO 80°C

Figure 3. Purge and trap system-purge mode.

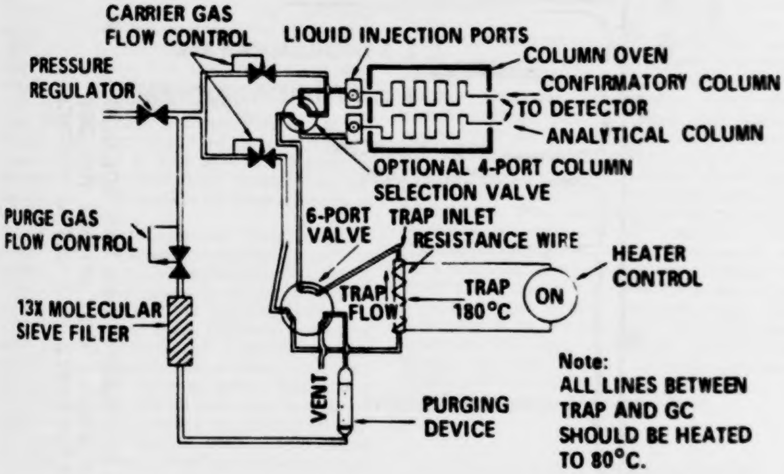
CARRIER GAS FLOW CONTROL
PRESSURE REGULATOR
LIQUID INJECTION PORTS
COLUMN OVEN
CONFIRMATORY COLUMN
TO DETECTOR
ANALYTICAL COLUMN
OPTIONAL 4-PORT COLUMN SELECTION VALVE
PURGE GAS FLOW CONTROL
6-PORT VALVE
TRAP INLET
RESISTANCE WIRE
HEATER CONTROL
TRAP FLOW
TRAP 180°C
ON
13X MOLECULAR SIEVE FILTER
VENT
PURGING DEVICE
Note: ALL LINES BETWEEN TRAP AND GC SHOULD BE HEATED TO 80°C.

Figure 4. Purge and trap system - desorb mode.

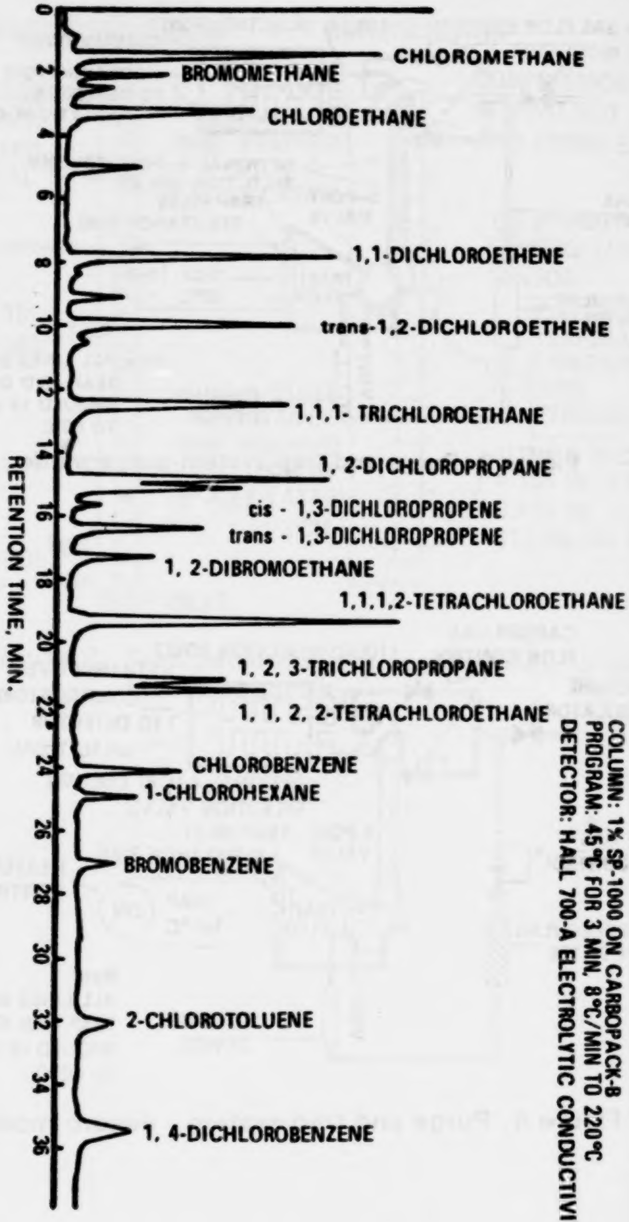

Figure 5. Gas chromatogram of purgeable halocarbons.

METHOD 602—PURGEABLE AROMATICS

1. Scope and Application

1.1 This method covers the determination of various purgeable aromatics. The following parameters may be determined by this method:

Parameter	STORET No.	CAS No.
Benzene	34030	71–43–2
Chlorobenzene	34301	108–90–7
1,2-Dichlorobenzene	34536	95–50–1
1,3-Dichlorobenzene	34566	541–73–1
1,4-Dichlorobenzene	34571	106–46–7
Ethylbenzene	34371	100–41–4
Toluene	34010	108–88–3

1.2 This is a purge and trap gas chromatographic (GC) method applicable to the determination of the compounds listed above in municipal and industrial discharges as provided under 40 CFR 136.1. When this method is used to analyze unfamiliar samples for any or all of the compounds above, compound identifications should be supported by at least one additional qualitative technique. This method describes analytical conditions for a second gas chromatographic column that can be used to confirm measurements made with the primary column. Method 624 provides gas chromatograph/mass spectrometer (GC/MS) conditions appropriate for the qualitative and quantitative confirmation of results for all of the parameters listed above.

1.3 The method detection limit (MDL, defined in Section 12.1) [1] for each parameter s listed in Table 1. The MDL for a specific wastewater may differ from those listed, depending upon the nature of interferences in the sample matrix.

1.4 Any modification of this method, eyond those expressly permitted, shall be onsidered as a major modification subject o application and approval of alternate test rocedures under 40 CFR 136.4 and 136.5.

1.5 This method is restricted to use by or nder the supervision of analysts experinced in the operation of a purge and trap ystem and a gas chromatograph and in the terpretation of gas chromatograms. Each nalyst must demonstrate the ability to genate acceptable results with this method sing the procedure described in Section 8.2.

2. Summary of Method

2.1 An inert gas is bubbled through a 5-mL water sample contained in a specially-esigned purging chamber at ambient temerature. The aromatics are efficiently ansferred from the aqueous phase to the por phase. The vapor is swept through a rbent trap where the aromatics are trapped. After purging is completed, the trap is heated and backflushed with the inert gas to desorb the aromatics onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the aromatics which are then detected with a photoionization detector.[1, 2]

2.2 The method provides an optional gas chromatographic column that may be helpful in resolving the compounds of interest from interferences that may occur.

3. Interferences

3.1 Impurities in the purge gas and organic compounds outgassing from the plumbing ahead of the trap account for the majority of contamination problems. The analytical system must be demonstrated to be free from contamination under the conditions of the analysis by running laboratory reagent blanks as described in Section 8.1.3. The use of non-Teflon plastic tubing, non-Teflon thread sealants, or flow controllers with rubber components in the purge and trap system should be avoided.

3.2 Samples can be contaminated by diffusion of volatile organics through the septum seal into the sample during shipment and storage. A field reagent blank prepared from reagent water and carried through the sampling and handling protocol can serve as a check on such contamination.

3.3 Contamination by carry-over can occur whenever high level and low level samples are sequentially analyzed. To reduce carry-over, the purging device and sample syringe must be rinsed with reagent water between sample analyses. Whenever an unusually concentrated sample is encountered, it should be followed by an analysis of reagent water to check for cross contamination. For samples containing large amounts of water-soluble materials, suspended solids, high boiling compounds or high aromatic levels, it may be necessary to wash the purging device with a detergent solution, rinse it with distilled water, and then dry it in an oven at 105 °C between analyses. The trap and other parts of the system are also subject to contamination; therefore, frequent bakeout and purging of the entire system may be required.

4. Safety

4.1 The toxicity or carcinogenicity of each reagent used in this method has not been precisely defined; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material data handling sheets should also be made available to all personnel involved in the chemical analysis. Additional references to laboratory safety are available and have been identified[**] for the information of the analyst.

4.2 The following parameters covered by this method have been tentatively classified as known or suspected, human or mammalian carcinogens: benzene and 1,4-dichlorobenzene. Primary standards of these toxic compounds should be prepared in a hood. A NIOSH/MESA approved toxic gas respirator should be worn when the analyst handles high concentrations of these toxic compounds.

5. Apparatus and Materials

5.1 Sampling equipment, for discrete sampling.

5.1.1 Vial]25-mL capacity or larger, equipped with a screw cap with a hole in the center (Pierce #13075 or equivalent). Detergent wash, rinse with tap and distilled water, and dry at 105 °C before use.

5.1.2 Septum—Teflon-faced silicone (Pierce #12722 or equivalent). Detergent wash, rinse with tap and distilled water, and dry at 105 °C for 1 h before use.

5.2 Purge and trap system—The purge and trap system consists of three separate pieces of equipment: A purging device, trap, and desorber. Several complete systems are now commercially available.

5.2.1 The purging device must be designed to accept 5-mL samples with a water column at least 3 cm deep. The gaseous head space between the water column and the trap must have a total volume of less than 15 mL. The purge gas must pass through the water column as finely divided bubbles with a diameter of less than 3 mm at the origin. The purge gas must be introduced no more than 5 mm from the base of the water column. The purging device illustrated in Figure 1 meets these design criteria.

5.2.2 The trap must be at least 25 cm long and have an inside diameter of at least 0.105 in.

5.2.2.1 The trap is packed with 1 cm of methyl silicone coated packing (Section 6.4.2) and 23 cm of 2,6-diphenylene oxide polymer (Section 6.4.1) as shown in Figure 2. This trap was used to develop the method performance statements in Section 12.

5.2.2.2 Alternatively, either of the two traps described in Method 601 may be used, although water vapor will preclude the measurement of low concentrations of benzene.

5.2.3 The desorber must be capable of rapidly heating the trap to 180 °C. The polymer section of the trap should not be heated higher than 180 °C and the remaining sections should not exceed 200 °C. The desorber illustrated in Figure 2 meets these design criteria.

5.2.4 The purge and trap system may be assembled as a separate unit or be coupled to a gas chromatograph as illustrated in Figures 3, 4, and 5.

5.3 Gas chromatograph—An analytical system complete with a temperature programmable gas chromatograph suitable for on-column injection and all required accessories including syringes, analytical columns, gases, detector, and strip-chart recorder. A data system is recommended for measuring peak areas.

5.3.1 Column 1—6 ft long x 0.082 in. ID stainless steel or glass, packed with 5% SP-1200 and 1.75% Bentone-34 on Supelcoport (100/120 mesh) or equivalent. This column was used to develop the method performance statements in Section 12. Guidelines for the use of alternate column packings are provided in Section 10.1.

5.3.2 Column 2—8 ft long x 0.1 in ID stainless steel or glass, packed with 5% 1,2,3-Tris(2-cyanoethoxy)propane on Chromosorb W-AW (60/80 mesh) or equivalent.

5.3.3 Detector—Photoionization detector (h-Nu Systems, Inc. Model PI-51-02 or equivalent). This type of detector has been proven effective in the analysis of wastewaters for the parameters listed in the scope (Section 1.1), and was used to develop the method performance statements in Section 12. Guidelines for the use of alternate detectors are provided in Section 10.1.

5.4 Syringes—5-mL glass hypodermic with Luerlok tip (two each), if applicable to the purging device.

5.5 Micro syringes—25-μL, 0.006 in. ID needle.

5.6 Syringe valve—2-way, with Luer ends (three each).

5.7 Bottle—15-mL, screw-cap, with Teflon cap liner.

5.8 Balance—Analytical, capable of accurately weighing 0.0001 g.

6. Reagents

6.1 Reagent water—Reagent water is defined as a water in which an interferent is not observed at the MDL of the parameters of interest.

6.1.1 Reagent water can be generated by passing tap water through a carbon filter bed containing about 1 lb of activated carbon (Filtrasorb-300, Calgon Corp., or equivalent).

6.1.2 A water purification system (Millipore Super-Q or equivalent) may be used to generate reagent water.

6.1.3 Reagent water may also be prepared by boiling water for 15 min. Subsequently, while maintaining the temperature at 90 °C, bubble a contaminant-free inert gas through the water for 1 h. While still hot, transfer the water to a narrow mouth screw-cap bottle and seal with a Teflon-lined septum and cap.

6.2 Sodium thiosulfate—(ACS) Granular.

6.3 Hydrochloric acid (1+1)—Add 50 mL of concentrated HCl (ACS) to 50 mL of reagent water.

6.4 Trap Materials:

6.4.1 2,6-Diphenylene oxide polymer—Tenax, (60/80 mesh), chromatographic grade or equivalent.

6.4.2 Methyl silicone packing—3% OV-1 on Chromosorb-W (60/80 mesh) or equivalent.

6.5 Methanol—Pesticide quality or equivalent.

6.6 Stock standard solutions—Stock standard solutions may be prepared from pure standard materials or purchased as certified solutions. Prepare stock standard solutions in methanol using assayed liquids. Because of the toxicity of benzene and 1,4-dichlorobenzene, primary dilutions of these materials should be prepared in a hood. A NIOSH/MESA approved toxic gas respirator should be used when the analyst handles high concentrations of such materials.

6.6.1 Place about 9.8 mL of methanol into a 10-mL ground glass stoppered volumetric flask. Allow the flask to stand, unstoppered, for about 10 min or until all alcohol wetted surfaces have dried. Weigh the flask to the nearest 0.1 mg.

6.6.2 Using a 100-μL syringe, immediately add two or more drops of assayed reference material to the flask, then reweigh. Be sure that the drops fall directly into the alcohol without contacting the neck of the flask.

6.6.3 Reweigh, dilute to volume, stopper, then mix by inverting the flask several times. Calculate the concentration in μg/μL from the net gain in weight. When compound purity is assayed to be 96% or greater, the weight can be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards can be used at any concentration if they are certified by the manufacturer or by an independent source.

6.6.4 Transfer the stock standard solution into a Teflon-sealed screw-cap bottle. Store at 4 °C and protect from light.

6.6.5 All standards must be replaced after one month, or sooner if comparison with check standards indicates a problem.

6.7 Secondary dilution standards—Using stock standard solutions, prepare secondary dilution standards in methanol that contain the compounds of interest, either singly or mixed together. The secondary dilution standards should be prepared at concentrations such that the aqueous calibration standards prepared in Section 7.3.1 or 7.4.1 will bracket the working range of the analytical system. Secondary solution standards must be stored with zero headspace and should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

6.8 Quality control check sample concentrate—See Section 8.2.1.

7. *Calibration*

7.1 Assemble a purge and trap system that meets the specifications in Section 5.2. Condition the trap overnight at 180 °C by backflushing with an inert gas flow of at least 20 mL/min. Condition the trap for 10 min once daily prior to use.

7.2 Connect the purge and trap system to a gas chromatograph. The gas chromatograph must be operated using temperature and flow rate conditions equivalent to those given in Table 1. Calibrate the purge and trap-gas chromatographic system using either the external standard technique (Section 7.3) or the internal standard technique (Section 7.4).

7.3 External standard calibration procedure:

7.3.1 Prepare calibration standards at a minimum of three concentration levels for each parameter by carefully adding 20.0 μL of one or more secondary dilution standards to 100, 500, or 1000 mL of reagent water. A 25-μL syringe with a 0.006 in. ID needle should be used for this operation. One of the external standards should be at a concentration near, but above, the MDL (Table 1) and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the detector. These aqueous standards must be prepared fresh daily.

7.3.2 Analyze each calibration standard according to Section 10, and tabulate peak height or area responses versus the concentration in the standard. The results can be used to prepare a calibration curve for each compound. Alternatively, if the ratio of response to concentration (calibration factor) is a constant over the working range (<10% relative standard deviation, RSD), linearity through the origin can be assumed and the average ratio or calibration factor can be used in place of a calibration curve.

7.4 Internal standard calibration procedure—To use this approach, the analyst must select one or more internal standards that are similar in analytical behavior to the compounds of interest. The analyst must further demonstrate that the measurement of the internal standard is not affected by method or matrix interferences. Because of these limitations, no internal standard can be suggested that is applicable to all samples. The compound, *α,α,α,*-trifluorotoluene, recommended as a surrogate spiking compound in Section 8.7 has been used successfully as an internal standard.

7.4.1 Prepare calibration standards at a minimum of three concentration levels for each parameter of interest as described in Section 7.3.1.

7.4.2 Prepare a spiking solution containing each of the internal standards using the procedures described in Sections 6.6 and 6.7. It is recommended that the secondary dilution standard be prepared at a concentration of 15 μg/mL of each internal standard compound. The addition of 10 μl of this standard to 5.0 mL of sample or calibration standard would be equivalent to 30 μg/L.

7.4.3 Analyze each calibration standard according to Section 10, adding 10 μL of internal standard spiking solution directly to the syringe (Section 10.4). Tabulate peak height or area responses against concentration for each compound and internal standard, and calculate response factors (RF) for each compound using Equation 1.

$$RF=\frac{(A_s)(C_{is})}{(A_{is})(C_s)}$$

Equation 1

where:

A_s=Response for the parameter to be measured.

A_{is}=Response for the internal standard.

C_{is}=Concentration of the internal standard

C_s=Concentration of the parameter to be measured.

If the RF value over the working range is a constant (<10% RSD), the RF can be assumed to be invariant and the average RF can be used for calculations. Alternatively, the results can be used to plot a calibration curve of response ratios, A_s/A_{is}, vs. RF.

7.5 The working calibration curve, calibration factor, or RF must be verified on each working day by the measurement of a QC check sample.

7.5.1 Prepare the QC check sample as described in Section 8.2.2.

7.5.2 Analyze the QC check sample according to Section 10.

7.5.3 For each parameter, compare the response (Q) with the corresponding calibration acceptance criteria found in Table 2. If the responses for all parameters of interest fall within the designated ranges, analysis of actual samples can begin. If any individual Q falls outside the range, a new calibration curve, calibration factor, or RF must be prepared for that parameter according to Section 7.3 or 7.4.

8. Quality Control

8.1 Each laboratory that uses this method is required to operate a formal quality control program. The mimimum requirements of this program consist of an initial demonstration of laboratory capability and an going analysis of spiked samples to evalu and document data quality. The laborato must maintain records to document quality of data that is generated. Ongoi data quality checks are compared with tablished performance criteria to determi if the results of analyses meet the perfor ance characteristics of the method. Wh results of sample spikes indicate atypi method performance, a quality cont check standard must be analyzed to confi that the measurements were performed an in-control mode of operation.

8.1.1 The analyst must make an initi one-time, demonstration of the ability generate acceptable accuracy and precisi with this method. This ability is establish as described in Section 8.2.

8.1.2 In recognition of advances that occurring in chromatography, the analyst permitted certain options (detailed in Se tion 10.1) to improve the separations lower the cost of measurements. Each tim such a modification is made to the metho the analyst is required to repeat the proc dure in Section 8.2.

8.1.3 Each day, the analyst must analy a reagent water blank to demonstrate th interferences from the analytical system under control.

8.1.4 The laboratory must, on an ongoi basis, spike and analyze a minimum of 10 of all samples to monitor and evaluate lab ratory data quality. This procedure is scribed in Section 8.3.

8.1.5 The laboratory must, on an ongoin basis, demonstrate through the analyses quality control check standards that the op eration of the measurement system is control. This procedure is described in Se tion 8.4. The frequency of the check stand ard analyses is equivalent to 10% of all sam ples analyzed but may be reduced if spik recoveries from samples (Section 8.3) me all specified quality control criteria.

8.1.6 The laboratory must maintain pe formance records to document the quali of data that is generated. This procedure described in Section 8.5.

8.2 To establish the ability to generat acceptable accuracy and precision, the an lyst must perform the following operation

8.2.1 A quality control (QC) chec sample concentrate is required containin each parameter of interest at a concentr tion of 10 μg/mL in methanol. The QC check sample concentrate must be obtaine from the U.S. Environmental Protectio Agency, Environmental Monitoring an Support Laboratory in Cincinnati, Ohio, i available. If not available from that sourc the QC check sample concentrate must b obtained from another external source. I not available from either source above, th QC check sample concentrate must be pr pared by the laboratory using stock standards prepared independently from those used for calibration.

8.2.2 Prepare a QC check sample to contain 20 μg/L of each parameter by adding 200 μL of QC check sample concentrate to 100 mL of reagant water.

8.2.3 Analyze four 5-mL aliquots of the well-mixed QC check sample according to Section 10.

8.2.4 Calculate the average recovery ($\bar{X}$) in μg/L, and the standard deviation of the recovery (s) in μg/L, for each parameter of interest using the four results.

8.2.5 For each parameter compare s and $\bar{X}$ with the corresponding acceptance criteria for precision and accuracy, respectively, found in Table 2. If s and $\bar{X}$ for all parameters of interest meet the acceptance criteria, the system performance is acceptable and analysis of actual samples can begin. If any individual s exceeds the precision limit or any individual $\bar{X}$ falls outside the range for accuracy, the system performance is unacceptable for that parameter.

NOTE: The large number of parameters in Table 2 present a substantial probability that one or more will fail at least one of the acceptance criteria when all parameters are analyzed.

8.2.6 When one or more of the parameters tested fail at least one of the acceptance criteria, the analyst must proceed according to Section 8.2.6.1 or 8.2.6.2.

8.2.6.1 Locate and correct the source of the problem and repeat the test for all parameters of interest beginning with Section 8.2.3.

8.2.6.2 Beginning with Section 8.2.3, repeat the test only for those parameters that failed to meet criteria. Repeated failure, however, will confirm a general problem with the measurement system. If this occurs, locate and correct the source of the problem and repeat the test for all compounds of interest beginning with Section 8.2.3.

8.3 The laboratory must, on an ongoing basis, spike at least 10% of the samples from each sample site being monitored to assess accuracy. For laboratories analyzing one to ten samples per month, at least one spiked sample per month is required.

8.3.1 The concentration of the spike in the sample should be determined as follows:

8.3.1.1 If, as in compliance monitoring, the concentration of a specific parameter in the sample is being checked against a regulatory concentration limit, the spike should be at that limit or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.2 If the concentration of a specific parameter in the sample is not being checked against a limit specific to that parameter, the spike should be at 20 μg/L or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.2 Analyze one 5-mL sample aliquot to determine the background concentration (B) of each parameter. If necessary, prepare a new QC check sample concentrate (Section 8.2.1) appropriate for the background concentrations in the sample. Spike a second 5-mL sample aliquot with 10 μL of the QC check sample concentrate and analyze it to determine the concentration after spiking (A) of each parameter. Calculate each percent recovery (P) as 100(A-B)%/T, where T is the known true value of the spike.

8.3.3 Compare the percent recovery (P) for each parameter with the corresponding QC acceptance criteria found in Table 2. These acceptance criteria were calculated to include an allowance for error in measurement of both the background and spike concentrations, assuming a spike to background ratio of 5:1. This error will be accounted for to the extent that the analyst's spike to background ratio approaches 5:1.[7] If spiking was performed at a concentration lower than 20 μg/L, the analyst must use either the QC acceptance criteria in Table 2, or optional QC acceptance criteria calculated for the specific spike concentration. To calculate optional acceptance criteria for the recovery of a parameter: (1) Calculate accuracy (X′) using the equation in Table 3, substituting the spike concentration (T) for C; (2) calculate overall precision (S′) using the equation in Table 3, substituting X′ for $\bar{X}$; (3) calculate the range for recovery at the spike concentration as (100 X′/T) ± 2.44(100 S′/T)%.[7]

8.3.4 If any individual P falls outside the designated range for recovery, that parameter has failed the acceptance criteria. A check standard containing each parameter that failed the criteria must be analyzed as described in Section 8.4.

8.4 If any parameter fails the acceptance criteria for recovery in Section 8.3, a QC check standard containing each parameter that failed must be prepared and analyzed.

NOTE: The frequency for the required analysis of a QC check standard will depend upon the number of parameters being simultaneously tested, the complexity of the sample matrix, and the performance of the laboratory.

8.4.1 Prepare the QC check standard by adding 10 μL of QC check sample concentrate (Section 8.2.1 or 8.3.2) to 5 mL of reagent water. The QC check standard needs only to contain the parameters that failed criteria in the test in Section 8.3.

8.4.2 Analyze the QC check standard to determine the concentration measured (A) of each parameter. Calculate each percent recovery (P_s) as 100 (A/T)%, where T is the true value of the standard concentration.

8.4.3 Compare the percent recovery (P_s) for each parameter with the corresponding QC acceptance criteria found in Table 2. Only parameters that failed the test in Section 8.3 need to be compared with these criteria. If the recovery of any such parameter falls outside the designated range, the laboratory performance for that parameter is judged to be out of control, and the problem must be immediately identified and corrected. The analytical result for that parameter in the unspiked sample is suspect and may not be reported for regulatory compliance purposes.

8.5 As part of the QC program for the laboratory, method accuracy for wastewater samples must be assessed and records must be maintained. After the analysis of five spiked wastewater samples as in Section 8.3, calculate the average percent recovery ($\bar{P}$) and the standard deviation of the percent recovery (s_p). Express the accuracy assessment as a percent recovery interval from $\bar{P}-2s_p$ to $\bar{P}+2s_p$. If $\bar{P}=90\%$ and $s_p=10\%$, for example, the accuracy interval is expressed as 70-110%. Update the accuracy assessment for each parameter on a regular basis (e.g. after each five to ten new accuracy measurements).

8.6 It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Field duplicates may be analyzed to assess the precision of the environmental measurements. When doubt exists over the identification of a peak on the chromatogram, confirmatory techniques such as gas chromatography with a dissimilar column, specific element detector, or mass spectrometer must be used. Whenever possible, the laboratory should analyze standard reference materials and participate in relevant performance evaluation studies.

8.7 The analyst should monitor both the performance of the analytical system and the effectiveness of the method in dealing with each sample matrix by spiking each sample, standard, and reagent water blank with surrogate compounds (e.g. α, α, α,-trifluorotoluene) that encompass the range of the temperature program used in this method. From stock standard solutions prepared as in Section 6.6, add a volume to give 750 μg of each surrogate to 45 mL of reagent water contained in a 50-mL volumetric flask, mix and dilute to volume for a concentration of 15 mg/μL. Add 10 μL of this surrogate spiking solution directly into the 5-mL syringe with every sample and reference standard analyzed. Prepare a fresh surrogate spiking solution on a weekly basis. If the internal standard calibration procedure is being used, the surrogate compounds may be added directly to the internal standard spiking solution (Section 7.4.2).

9. Sample Collection, Preservation, and Handling

9.1 The samples must be iced or refrigerated from the time of collection until analysis. If the sample contains free or combined chlorine, add sodium thiosulfate preservative (10 mg/40 mL is sufficient for up to 5 ppm Cl_2) to the empty sample bottle just prior to shipping to the sampling site. EPA Method 330.4 or 330.5 may be used for measurement of residual chlorine.[8] Field test kits are available for this purpose.

9.2 Collect about 500 mL of sample in a clean container. Adjust the pH of the sample to about 2 by adding 1+1 HCl while stirring. Fill the sample bottle in such a manner that no air bubbles pass through the sample as the bottle is being filled. Seal the bottle so that no air bubbles are entrapped in it. Maintain the hermetic seal on the sample bottle until time of analysis.

9.3 All samples must be analyzed within 14 days of collection.[3]

10. Procedure

10.1 Table 1 summarizes the recommended operating conditions for the gas chromatograph. Included in this table are estimated retention times and MDL that can be achieved under these conditions. An example of the separations achieved by Column 1 is shown in Figure 6. Other packed columns, chromatographic conditions, or detectors may be used if the requirements of Section 8.2 are met.

10.2 Calibrate the system daily as described in Section 7.

10.3 Adjust the purge gas (nitrogen or helium) flow rate to 40 mL/min. Attach the trap inlet to the purging device, and set the purge and trap system to purge (Figure 3). Open the syringe valve located on the purging device sample introduction needle.

10.4 Allow the sample to come to ambient temperature prior to introducing it to the syringe. Remove the plunger from a 5-mL syringe and attach a closed syringe valve. Open the sample bottle (or standard) and carefully pour the sample into the syringe barrel to just short of overflowing. Replace the syringe plunger and compress the sample. Open the syringe valve and vent any residual air while adjusting the sample volume to 5.0 mL. Since this process of taking an aliquot destroys the validity of the sample for future analysis, the analyst should fill a second syringe at this time to protect against possible loss of data. Add 10.0 μL of the surrogate spiking solution (Section 8.7) and 10.0 μL of the internal standard spiking solution (Section 7.4.2), if applicable, through the valve bore, then close the valve.

10.5 Attach the syringe-syringe valve assembly to the syringe valve on the purging device. Open the syringe valves and inject the sample into the purging chamber.

10.6 Close both valves and purge the sample for 12.0±0.1 min at ambient temperature.

10.7 After the 12-min purge time, disconnect the purging device from the trap. Dry the trap by maintaining a flow of 40 mL/min of dry purge gas through it for 6 min (Figure 4). If the purging device has no provision for bypassing the purger for this step, a dry purger should be inserted into the device to minimize moisture in the gas. Attach the trap to the chromatograph, adjust the purge and trap system to the desorb mode (Figure 5), and begin to temperature program the gas chromatograph. Introduce the trapped materials to the GC column by rapidly heating the trap to 180 °C while backflushing the trap with an inert gas between 20 and 60 mL/min for 4 min. If rapid heating of the trap cannot be achieved, the GC column must be used as a secondary trap by cooling it to 30 °C (subambient temperature, if poor peak geometry and random retention time problems persist) instead of the initial program temperature of 50 °C.

10.8 While the trap is being desorbed into the gas chromatograph column, empty the purging chamber using the sample introduction syringe. Wash the chamber with two 5-mL flushes of reagent water.

10.9 After desorbing the sample for 4 min, recondition the trap by returning the purge and trap system to the purge mode. Wait 15 s, then close the syringe valve on the purging device to begin gas flow through the trap. The trap temperature should be maintained at 180 °C. After approximately 7 min, turn off the trap heater and open the syringe valve to stop the gas flow through the trap. When the trap is cool, the next sample can be analyzed.

10.10 Identify the parameters in the sample by comparing the retention times of the peaks in the sample chromatogram with those of the peaks in standard chromatograms. The width of the retention time window used to make identifications should be based upon measurements of actual retention time variations of standards over the course of a day. Three times the standard deviation of a retention time for a compound can be used to calculate a suggested window size; however, the experience of the analyst should weigh heavily in the interpretation of chromatograms.

10.11 If the response for a peak exceeds the working range of the system, prepare a dilution of the sample with reagent water from the aliquot in the second syringe and reanalyze.

11. Calculations

11.1 Determine the concentration of individual compounds in the sample.

11.1.1 If the external standard calibration procedure is used, calculate the concentration of the parameter being measured from the peak response using the calibration curve or calibration factor determined in Section 7.3.2.

11.1.2 If the internal standard calibration procedure is used, calculate the concentration in the sample using the response factor (RF) determined in Section 7.4.3 and Equation 2.

$$\text{Concentration } (\mu g/L) = \frac{(A_s)(C_{is})}{(A_{is})(RF)}$$

Equation 2

where:

A_s = Response for the parameter to be measured.

A_{is} = Response for the internal standard.

C_{is} = Concentration of the internal standard.

11.2 Report results in μg/L without correction for recovery data. All QC data obtained should be reported with the sample results.

12. Method Performance

12.1 The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero.[1] The MDL concentrations listed in Table 1 were obtained using reagent water.[9] Similar results were achieved using representative wastewaters. The MDL actually achieved in a given analysis will vary depending on instrument sensitivity and matrix effects.

12.2 This method has been demonstrated to be applicable for the concentration range from the MDL to 100 X MDL.[9] Direct aqueous injection techniques should be used to measure concentration levels above 1000 x MDL.

12.3 This method was tested by 20 laboratories using reagent water, drinking water, surface water, and three industrial wastewaters spiked at six concentrations over the range 2.1 to 550 µg/L.[9] Single operator precision, overall precision, and method accuracy were found to be directly related to the concentration of the parameter and essentially independent of the sample matrix. Linear equations to describe these relationships are presented in Table 3.

References

1. 40 CFR Part 136, Appendix B.

2. Lichtenberg, J.J. "Determining Volatile Organics at Microgram-per-Litre-Levels by Gas Chromatography," Journal American Water Works Association, *66*, 739 (1974).

3. Bellar, T.A., and Lichtenberg, J.J. "Semi-Automated Headspace Analysis of Drinking Waters and Industrial Waters for Purgeable Volatile Organic Compounds," Proceedings of Symposium on Measurement of Organic Pollutants in Water and Wastewater. American Society for Testing and Materials, STP 686, C.E. Van Hall, editor, 1978.

4. "Carcinogens—Working with Carcinogens," Department of Health, Education, and Welfare, Public Health Service, Center for Disease Control, National Institute for Occupational Safety and Health. Publication No. 77-206, August 1977.

5. "OSHA Safety and Health Standards, General Industry," (29 CFR Part 1910), Occupational Safety and Health Administration, OSHA 2206 (Revised, January 1976).

6. "Safety in Academic Chemistry Laboratories," American Chemical Society Publication, Committee on Safety, 3rd Edition, 1979.

7. Provost, L.P., and Elder, R.S. "Interpretation of Percent Recovery Data," *American Laboratory, 15*, 58-63 (1983). (The value 2.44 used in the equation in Section 8.3.3. is two times the value 1.22 derived in this report.)

8. "Methods 330.4 (Titrimetric, DPD-FAS) and 330.5 (Spectrophotometric, DPD) for Chlorine, Total Residual," Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, U.S. Environmental Protection Agency, Office of Research and Development, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268, March 1979.

9. "EPA Method Study 25, Method 602, Purgeable Aromatics," EPA 600/4-84-042, National Technical Information Service, PB84-196682, Springfield, Virginia 22161, May 1984.

TABLE 1.—CHROMATOGRAPHIC CONDITIONS AND METHOD DETECTION LIMITS

Parameter	Retention time (min)		Method detection limit (µg/L)
	Column 1	Column 2	
Benzene	3.33	2.75	0.2
Toluene	5.75	4.25	0.2
Ethylbenzene	8.25	6.25	0.2
Chlorobenzene	9.17	8.02	0.2
1,4-Dichlorobenzene	16.8	16.2	0.3
1,3-Dichlorobenzene	18.2	15.0	0.4
1,2-Dichlorobenzene	25.9	19.4	0.4

Column 1 conditions: Supelcoport (100/120 mesh) coated with 5% SP-1200/1.75% Bentone-34 packed in a 6 ft x 0.085 in. ID stainless steel column with helium carrier gas at 36 mL/min flow rate. Column temperature held at 50 °C for 2 min then programmed at 6 °C/min to 90 °C for a final hold.

Column 2 conditions: Chromosorb W-AW (60/80 mesh) coated with 5% 1,2,3-Tris(2-cyanoethyoxy)propane packed in a 6 ft x 0.085 in. ID stainless steel column with helium carrier gas at 30 mL/min flow rate. Column temperature held at 40 °C for 2 min then programmed at 2 °C/min to 100 °C for a final hold.

TABLE 2.—CALIBRATION AND QC ACCEPTANCE CRITERIA—METHOD 602 [a]

Parameter	Range for Q (µg/L)	Limit for s (µg/L)	Range for $\bar{X}$ (µg/L)	Range for P, P_s (%)
Benzene	15.4–24.6	4.1	10.0–27.9	39-150
Chlorobenzene	16.1–23.9	3.5	12.7–25.4	55-135
1,2-Dichlorobenzene	13.6–26.4	5.8	10.6–27.6	37-154
1,3-Dichlorobenzene	14.5–25.5	5.0	12.8–25.5	50-141
1,4-Dichlorobenzene	13.9–26.1	5.5	11.6–25.5	42-143
Ethylbenzene	12.6–27.4	6.7	10.0–28.2	32-160
Toluene	15.5–24.5	4.0	11.2–27.7	46-148

Q=Concentration measured in QC check sample, in µg/L (Section 7.5.3).
s=Standard deviation of four recovery measurements, in µg/L (Section 8.2.4).
$\bar{X}$=Average recovery for four recovery measurements, in µg/L (Section 8.2.4).
P_s, P=Percent recovery measured (Section 8.3.2, Section 8.4.2).

[a] Criteria were calculated assuming a QC check sample concentration of 20 µg/L.

Note: These criteria are based directly upon the method performance data in Table 3. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table 3.

TABLE 3.—METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION—METHOD 602

Parameter	Accuracy, as recovery, X′ (μg/L)	Single analyst precision, s′ (μg/L)	Overall precision, S′ (μg/L)
Benzene	$0.92C + 0.57$	$0.09\bar{X} + 0.59$	$0.21\bar{X} + 0.56$
Chlorobenzene	$0.95C + 0.02$	$0.09\bar{X} + 0.23$	$0.17\bar{X} + 0.10$
1,2-Dichlorobenzene	$0.93C + 0.52$	$0.17\bar{X} - 0.04$	$0.22\bar{X} + 0.53$
1,3-Dichlorobenzene	$0.96C - 0.05$	$0.15\bar{X} - 0.10$	$0.19\bar{X} + 0.09$
1,4-Dichlorobenzene	$0.93C - 0.09$	$0.15\bar{X} + 0.28$	$0.20\bar{X} + 0.41$
Ethylbenzene	$0.94C + 0.31$	$0.17\bar{X} + 0.46$	$0.26\bar{X} + 0.23$
Toluene	$0.94C + 0.65$	$0.09\bar{X} + 0.48$	$0.18\bar{X} + 0.71$

X′ = Expected recovery for one or more measurements of a sample containing a concentration of C, in μg/L.
s′ = Expected single analyst standard deviation of measurements at an average concentration found of $\bar{X}$, in μg/L.
S′ = Expected interlaboratory standard deviation of measurements at an average concentration found of $\bar{X}$, in μg/L.
C = True value for the Concentration, in μg/L.
$\bar{X}$ = Average recovery found for measurements of samples containing a concentration of C, in μg/L.

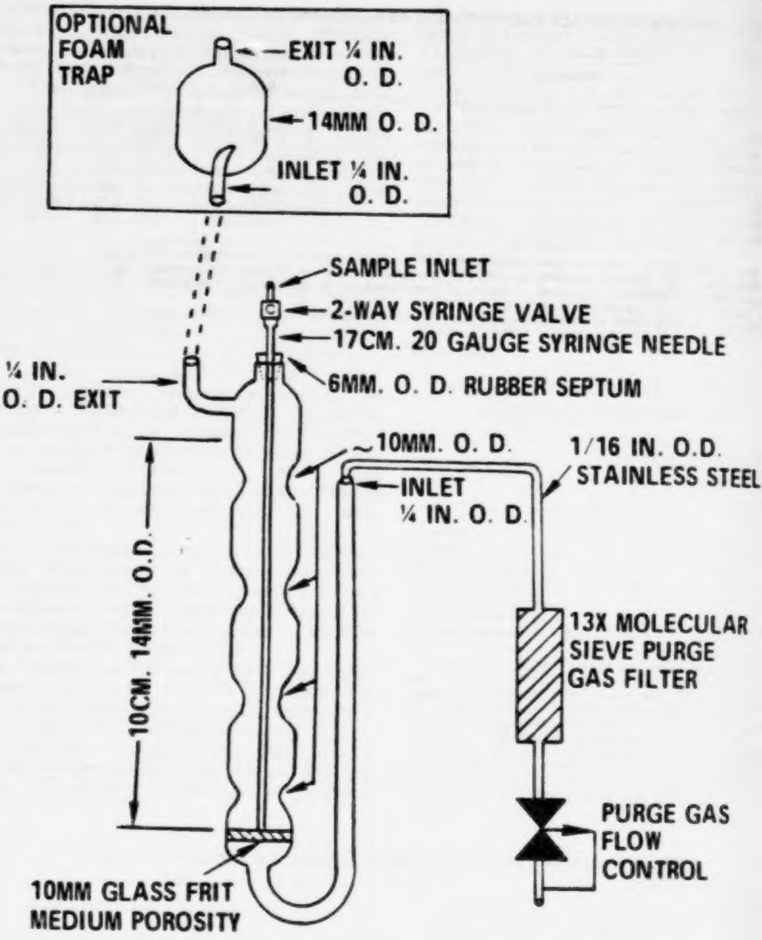
OPTIONAL
FOAM
TRAP
EXIT ¼ IN. O. D.
14MM O. D.
INLET ¼ IN. O. D.
SAMPLE INLET
2-WAY SYRINGE VALVE
17CM. 20 GAUGE SYRINGE NEEDLE
6MM. O. D. RUBBER SEPTUM
¼ IN. O. D. EXIT
~10MM. O. D.
1/16 IN. O.D. STAINLESS STEEL
INLET ¼ IN. O. D.
10CM. 14MM. O.D.
13X MOLECULAR SIEVE PURGE GAS FILTER
PURGE GAS FLOW CONTROL
10MM GLASS FRIT MEDIUM POROSITY

Figure 1. Purging device.

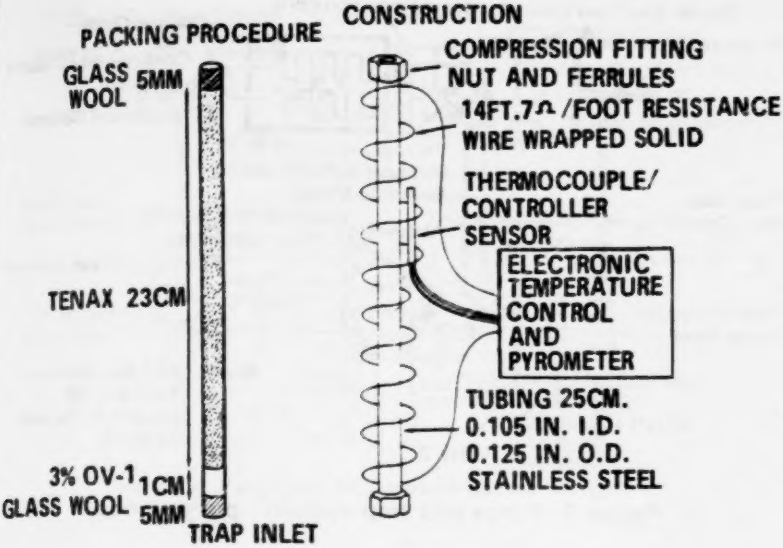
PACKING PROCEDURE
GLASS WOOL 5MM
TENAX 23CM
3% OV-1 1CM
GLASS WOOL 5MM
TRAP INLET
CONSTRUCTION
COMPRESSION FITTING NUT AND FERRULES
14FT.7Ω /FOOT RESISTANCE WIRE WRAPPED SOLID
THERMOCOUPLE/ CONTROLLER SENSOR
ELECTRONIC TEMPERATURE CONTROL AND PYROMETER
TUBING 25CM. 0.105 IN. I.D. 0.125 IN. O.D. STAINLESS STEEL

Figure 2. Trap packings and construction to include desorb capability.

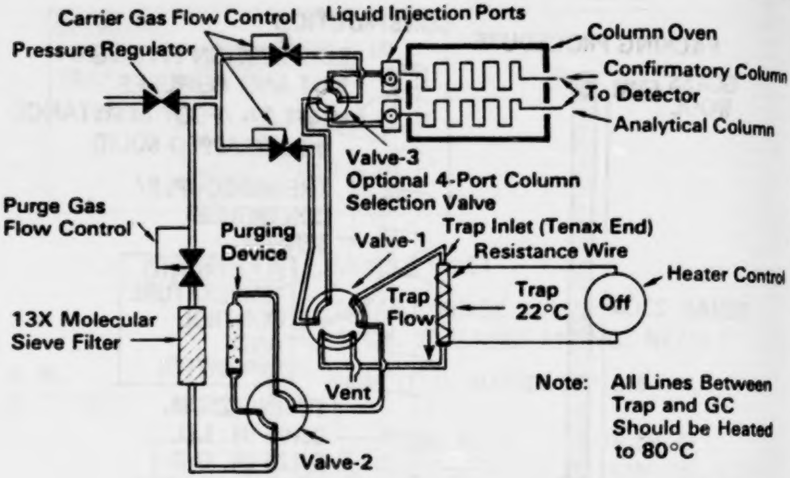
Carrier Gas Flow Control
Liquid Injection Ports
Column Oven
Pressure Regulator
Confirmatory Column
To Detector
Analytical Column
Valve-3
Optional 4-Port Column
Selection Valve
Purge Gas
Flow Control
Purging
Device
Valve-1
Trap Inlet (Tenax End)
Resistance Wire
Heater Control
Trap
Flow
Trap
22°C
Off
13X Molecular
Sieve Filter
Vent
Note: All Lines Between
Trap and GC
Should be Heated
to 80°C
Valve-2

Figure 3. Purge and trap system - purge mode.

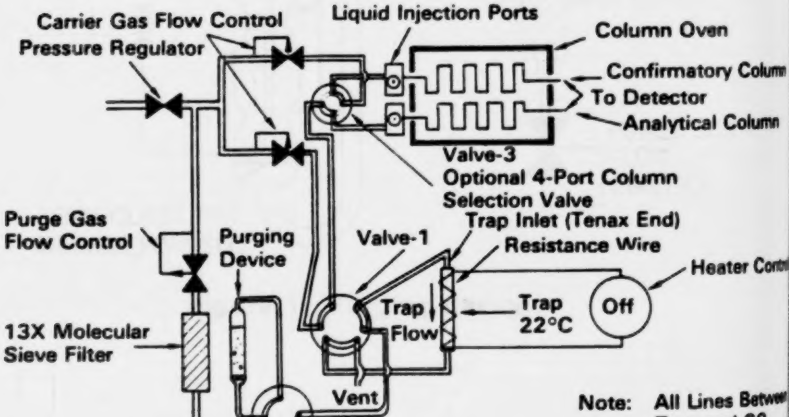
Carrier Gas Flow Control
Liquid Injection Ports
Pressure Regulator
Column Oven
Confirmatory Colum
To Detector
Analytical Column
Valve-3
Optional 4-Port Column
Selection Valve
Purge Gas
Flow Control
Purging
Device
Valve-1
Trap Inlet (Tenax End)
Resistance Wire
Heater Cont
Trap
Flow
Trap
22°C
Off
13X Molecular
Sieve Filter
Vent
Note: All Lines Betwe
Trap and GC
Should be Hea
to 80°C
Valve-2

Figure 4. Purge and trap system-dry mode.

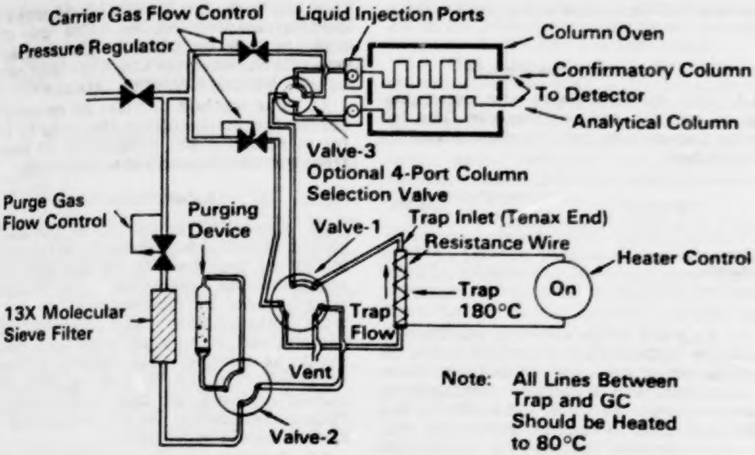
Carrier Gas Flow Control
Liquid Injection Ports
Pressure Regulator
Column Oven
Confirmatory Column
To Detector
Analytical Column
Valve-3
Optional 4-Port Column
Selection Valve
Purge Gas
Flow Control
Purging
Device
Valve-1
Trap Inlet (Tenax End)
Resistance Wire
Heater Control
On
Trap
180°C
13X Molecular
Sieve Filter
Trap
Flow
Vent
Valve-2
Note: All Lines Between
Trap and GC
Should be Heated
to 80°C

Figure 5. Purge and trap system-desorb mode.

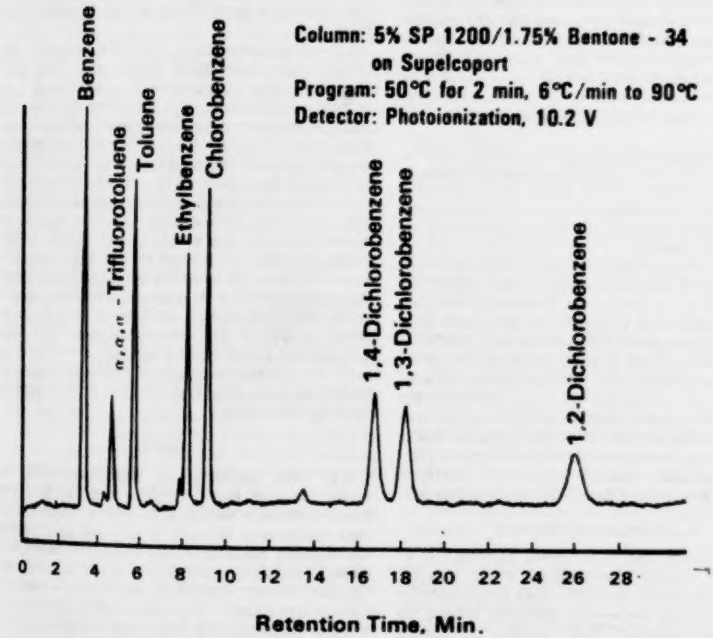

Figure 6. Gas chromatogram of purgeable aromatics.

METHOD 603—ACROLEIN AND ACRYLONITRILE

1. Scope and Application

1.1 This method covers the determination of acrolein and acrylonitrile. The following parameters may be determined by this method:

Parameter	STORET No.	CAS No.
Acrolein	34210	107-02-8
Acrylonitrile	34215	107-13-1

1.2 This is a purge and trap gas chromatographic (GC) method applicable to the determination of the compounds listed above in municipal and industrial discharges as provided under 40 CFR 136.1. When this method is used to analyze unfamiliar samples for either or both of the compounds above, compound identifications should be supported by at least one additional qualitative technique. This method describes analytical conditions for a second gas chromatographic column that can be used to confirm measurements made with the primary column. Method 624 provides gas chromatograph/mass spectrometer (GC/MS) conditions appropriate for the qualitative and quantitative confirmation of results for the parameters listed above, if used with the purge and trap conditions described in this method.

1.3 The method detection limit (MDL, defined in Section 12.1)[1] for each parameter is listed in Table 1. The MDL for a specific wastewater may differ from those listed, depending upon the nature of interferences in the sample matrix.

1.4 Any modification of this method, beyond those expressly permitted, shall be considered as a major modification subject to application and approval of alternate test procedures under 40 CFR 136.4 and 136.5.

1.5 This method is restricted to use by or under the supervision of analysts experienced in the operation of a purge and trap system and a gas chromatograph and in the interpretation of gas chromatograms. Each analyst must demonstrate the ability to generate acceptable results with this method using the procedure described in Section 8.2.

2. Summary of Method

2.1 An inert gas is bubbled through a 5-mL water sample contained in a heated purging chamber. Acrolein and acrylonitrile are transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent trap where the analytes are trapped. After the purge is completed, the trap is heated and backflushed with the inert gas to desorb the compound onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the analytes which are then detected with a flame ionization detector.[2,3]

2.2 The method provides an optional gas chromatographic column that may be helpful in resolving the compounds of interest from the interferences that may occur.

3. Interferences

3.1 Impurities in the purge gas and organic compound outgassing from the plumbing of the trap account for the majority of contamination problems. The analytical system must be demonstrated to be free from contamination under the conditions of the analysis by running laboratory reagent blanks as described in Section 8.1.3. The use of non-Teflon plastic tubing, non-Teflon thread sealants, or flow controllers with rubber components in the purge and trap system should be avoided.

3.2 Samples can be contaminated by diffusion of volatile organics through the septum seal into the sample during shipment and storage. A field reagent blank prepared from reagent water and carried through the sampling and handling protocol can serve as a check on such contamination.

3.3 Contamination by carry-over can occur whenever high level and low level samples are sequentially analyzed. To reduce carry-over, the purging device and sample syringe must be rinsed between samples with reagent water. Whenever an unusually concentrated sample is encountered, it should be followed by an analysis of reagent water to check for cross contamination. For samples containing large amounts of water-soluble materials, suspended solids, high boiling compounds or high analyte levels, it may be necessary to wash the purging device with a detergent solution, rinse it with distilled water, and then dry it in an oven at 105 °C between analyses. The trap and other parts of the system are also subject to contamination, therefore, frequent bakeout and purging of the entire system may be required.

4. Safety

4.1 The toxicity or carcinogenicity of each reagent used in this method has not been precisely defined; however, each chemical compound should be treated as a potential health hazard. From this view point, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material data handling sheets should also be made available to all personnel involved in the chemical analysis. Additional references to laboratory safety are available and have been identified[4,6] for the information of the analyst.

5. *Apparatus and Materials*

5.1 Sampling equipment, for discrete ampling.

5.1.1 Vial—25-mL capacity or larger, quipped with a screw cap with a hole in the enter (Pierce #13075 or equivalent). Detergent wash, rinse with tap and distilled vater, and dry at 105 °C before use.

5.1.2 Septum—Teflon-faced silicone Pierce #12722 or equivalent). Detergent vash, rinse with tap and distilled water and ry at 105 °C for 1 h before use.

5.2 Purge and trap system—The purge nd trap system consists of three separate ieces of equipment: a purging device, trap, nd desorber. Several complete systems are ow commercially available.

5.2.1 The purging device must be deigned to accept 5-mL samples with a water olumn at least 3 cm deep. The gaseous ead space between the water column and he trap must have a total volume of less han 15 mL. The purge gas must pass hrough the water column as finely divided ubbles with a diameter of less than 3 mm t the origin. The purge gas must be introuced no more than 5 mm from the base of he water column. The purging device must e capable of being heated to 85 °C within 0 min after transfer of the sample to the urging device and being held at 85 ±2 °C uring the purge cycle. The entire water olumn in the purging device must be eated. Design of this modification to the andard purging device is optional, howev- , use of a water bath is suggested.

5.2.1.1 Heating mantle—To be used to eat water bath.

5.2.1.2 Temperature controller— quipped with thermocouple/sensor to acrately control water bath temperature to 2 °C. The purging device illustrated in igure 1 meets these design criteria.

5.2.2 The trap must be at least 25 cm ng and have an inside diameter of at least 105 in. The trap must be packed to contain 0 cm of methyl silicone coated packing ection 6.5.2) and 23 cm of 2,6-diphenylene ide polymer (Section 6.5.1). The minimum ecifications for the trap are illustrated in igure 2.

5.2.3 The desorber must be capable of pidly heating the trap to 180 °C. The derber illustrated in Figure 2 meets these esign criteria.

5.2.4 The purge and trap system may be sembled as a separate unit as illustrated Figure 3 or be coupled to a gas chromatoaph.

5.3 pH paper—Narrow pH range, about 3.5 to 5.5 (Fisher Scientific Short Range Alkacid No. 2, #14-837-2 or equivalent).

5.4 Gas chromatograph—An analytical system complete with a temperature programmable gas chromatograph suitable for on-column injection and all required accessories including syringes, analytical columns, gases, detector, and strip-chart recorder. A data system is recommended for measuring peak areas.

5.4.1 Column 1—10 ft long x 2 mm ID glass or stainless steel, packed with Porapak-QS (80/100 mesh) or equivalent. This column was used to develop the method performance statements in Section 12. Guidelines for the use of alternate column packings are provided in Section 10.1.

5.4.2 Column 2—6 ft long x 0.1 in. ID glass or stainless steel, packed with Chromosorb 101 (60/80 mesh) or equivalent.

5.4.3 Detector—Flame ionization detector. This type of detector has proven effective in the analysis of wastewaters for the parameters listed in the scope (Section 1.1), and was used to develop the method performance statements in Section 12. Guidelines for the use of alternate detectors are provided in Section 10.1.

5.5 Syringes—5-mL, glass hypodermic with Luerlok tip (two each).

5.6 Micro syringes—25-µL, 0.006 in. ID needle.

5.7 Syringe valve—2-way, with Luer ends (three each).

5.8 Bottle—15-mL, screw-cap, with Teflon cap liner.

5.9 Balance—Analytical, capable of accurately weighing 0.0001 g.

6. *Reagents*

6.1 Reagent water—Reagent water is defined as a water in which an interferent is not observed at the MDL of the parameters of interest.

6.1.1 Reagent water can be generated by passing tap water through a carbon filter bed containing about 1 lb of activated carbon (Filtrasorb-300, Calgon Corp., or equivalent).

6.1.2 A water purification system (Millipore Super-Q or equivalent) may be used to generate reagent water.

6.1.3 Regent water may also be prepared by boiling water for 15 min. Subsequently, while maintaining the temperature at 90 °C, bubble a contaminant-free inert gas through the water for 1 h. While still hot, transfer the water to a narrow mouth screw-cap bottle and seal with a Teflon-lined septum and cap.

6.2 Sodium thiosulfate—(ACS) Granular.

6.3 Sodium hydroxide solution (10 N)—Dissolve 40 g of NaOH (ACS) in reagent water and dilute to 100 mL.

6.4 Hydrochloric acid (1+1)—Slowly, add 50 mL of concentrated HCl (ACS) to 50 mL of reagent water.

6.5 Trap Materials:

6.5.1 2,6-Diphenylene oxide polymer—Tenax (60/80 mesh), chromatographic grade or equivalent.

6.5.2 Methyl silicone packing—3% OV-1 on Chromosorb-W (60/80 mesh) or equivalent.

6.6 Stock standard solutions—Stock standard solutions may be prepared from pure standard materials or purchased as certified solutions. Prepare stock standard solutions in reagent water using assayed liquids. Since acrolein and acrylonitrile are lachrymators, primary dilutions of these compounds should be prepared in a hood. A NIOSH/MESA approved toxic gas respirator should be used when the analyst handles high concentrations of such materials.

6.6.1 Place about 9.8 mL of reagent water into a 10-mL ground glass stoppered volumetric flask. For acrolein standards the reagent water must be adjusted to pH 4 to 5. Weight the flask to the nearest 0.1 mg.

6.6.2 Using a 100-μL syringe, immediately add two or more drops of assayed reference material to the flask, then reweigh. Be sure that the drops fall directly into the water without contacting the neck of the flask.

6.6.3 Reweigh, dilute to volume, stopper, then mix by inverting the flask several times. Calculate the concentration in μg/μL from the net gain in weight. When compound purity is assayed to be 96% or greater, the weight can be used without correction to calculate the concentration of the stock staldard. Optionally, stock standard solutions may be prepared using the pure standard material by volumetrically measuring the appropriate amounts and determining the weight of the material using the density of the material. Commercially prepared stock standards may be used at any concentration if they are certified by the manufactaurer or by an independent source.

6.6.4 Transfer the stock standard solution into a Teflon-sealed screw-cap bottle. Store at 4 °C and protect from light.

6.6.5 Prepare fresh standards daily.

6.7 Secondary dilution standards—Using stock standard solutions, prepare secondary dilution standards in reagent water that contain the compounds of interest, either singly or mixed together. The secondary dilution standards should be prepared at concentrations such that the aqueous calibration standards prepared in Section 7.3.1 or 7.4.1 will bracket the working range of the analytical system. Secondary dilution standards should be prepared daily and stored at 4 °C.

6.8 Quality control check sample concentrate—See Section 8.2.1.

7. Calibration

7.1 Assemble a purge and trap sy that meets the specifications in Section Condition the trap overnight at 180 °C backflushing with an inert gas flow o least 20 mL/min. Condition the trap fo min once daily prior to use.

7.2 Connect the purge and trap syster a gas chromatograph. The gas chrom graph must be operated using temperat and flow rate conditions equivalent to th given in Table 1. Calibrate the purge trap-gas chromatographic system u either the external standard technique (S tion 7.3) or the internal standard techni (Section 7.4).

7.3 External standard calibration pro dure:

7.3.1 Prepare calibration standards a minimum of three concentration levels each parameter by carefully adding 20.0 of one or more secondary dilution standa to 100, 500, or 1000 mL of reagent water 25-μL syringe with a 0.006 in. ID nee should be used for this operation. One the external standards should be at a c centration near, but above, the MDL a the other concentrations should correspo to the expected range of concentratio found in real samples or should define t working range of the detector. These sta ards must be prepared fresh daily.

7.3.2 Analyze each calibration standa according to Section 10, and tabulate pe height or area responses versus the conce tration of the standard. The results can used to prepare a calibration curve for ea compound. Alternatively, if the ratio of r sponse to concentration (calibration facto is a constant over the working range (< 10 relative standard deviation, RSD), linearit through the origin can be assumed and th average ratio or calibration factor can b used in place of a calibration curve.

7.4 Internal standard calibration proc dure—To use this approach, the analy must select one or more internal standar that are similar in analytical behavior t the compounds of interest. The analy must further demonstrate that the mea urement of the internal standard is not a fected by method or matrix interferences Because of these limitations, no interna standard can be suggested that is applicab to all samples.

7.4.1 Prepare calibration standards at minimum of three concentration levels fo each parameter of interest as described i Section 7.3.1.

7.4.2 Prepare a spiking solution contai ing each of the internal standards using th procedures described in Sections 6.6 and 6.7 It is recommended that the secondary dil tion standard be prepared at a concentra tion of 15 μg/mL of each internal standar compound. The addition of 10 μL of this standard to 5.0 mL of sample or calibration standard would be equivalent to 30 μg/L.

7.4.3 Analyze each calibration standard according to Section 10, adding 10 μL of internal standard spiking solution directly to the syringe (Section 10.4). Tabulate peak height or area responses against concentration for each compound and internal standard, and calculate response factors (RF) for each compound using Equation 1.

$$RF = \frac{(A_s)(C_{is})}{(A_{is})(C_s)}$$

Equation 1

where:

A_s=Response for the parameter to be measured.

A_{is}=Response for the interna! standard.

C_{is}=Concentration of the internal standard.

C_s=Concentration of the parameter to be measured.

If the RF value over the working range is a constant (<10% RSD), the RF can be assumed to be invariant and the average RF can be used for calculations. Alternatively, the results can be used to plot a calibration curve of response ratios, A_s/A_{is}, vs. RF.

7.5 The working calibration curve, calibration factor, or RF must be verified on each working day by the measurement of a QC check sample.

7.5.1 Prepare the QC check sample as described in Section 8.2.2.

7.5.2 Analyze the QC check sample according to Section 10.

7.5.3 For each parameter, compare the response (Q) with the corresponding calibration acceptance criteria found in Table 2. If the responses for all parameters of interest fall within the designated ranges, analysis of actual samples can begin. If any individual Q falls outside the range, a new calibration curve, calibration factor, or RF must be prepared for that parameter according to Section 7.3 or 7.4.

8. Quality Control

8.1 Each laboratory that uses this method is required to operate a formal quality control program. The minimum requirements of this program consist of an initial demonstration of laboratory capability and an ongoing analysis of spiked samples to evaluate and document data quality. The laboratory must maintain records to document the quality of data that is generated. Ongoing data quality checks are compared with established performance criteria to determine if the results of analyses meet the performance characteristics of the method. When results of sample spikes indicate atypical method performance, a quality control check standard must be analyzed to confirm that the measurements were performed in an in-control mode of operation.

8.1.1 The analyst must make an initial, one-time, demonstration of the ability to generate acceptable accuracy and precision with this method. This ability is established as described in Section 8.2.

8.1.2 In recognition of advances that are occurring in chromatography, the analyst is permitted certain options (detailed in Section 10.1) to improve the separations or lower the cost of measurements. Each time such a modification is made to the method, the analyst is required to repeat the procedure in Section 8.2.

8.1.3 Each day, the analyst must analyze a reagent water blank to demonstrate that interferences from the analytical system are under control.

8.1.4 The laboratory must, on an ongoing basis, spike and analyze a minimum of 10% of all samples to monitor and evaluate laboratory data quality. This procedure is described in Section 8.3.

8.1.5 The laboratory must, on an ongoing basis, demonstrate through the analyses of quality control check standards that the operation of the measurement system is in control. This procedure is described in Section 8.4. The frequency of the check standard analyses is equivalent to 10% of all samples analyzed but may be reduced if spike recoveries from samples (Section 8.3) meet all specified quality control criteria.

8.1.6 The laboratory must maintain performance records to document the quality of data that is generated. This procedure is described in Section 8.5.

8.2 To establish the ability to generate acceptable accuracy and precision, the analyst must perform the following operations.

8.2.1 A quality control (QC) check sample concentrate is required containing each parameter of interest at a concentration of 25 μg/mL in reagent water. The QC check sample concentrate must be obtained from the U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory in Cincinnati, Ohio, if available. If not available from that source, the QC check sample concentrate must be obtained from another external source. If not available from either source above, the QC check sample concentrate must be prepared by the laboratory using stock standards prepared independently from those used for calibration.

8.2.2 Prepare a QC check sample to contain 50 μg/L of each parameter by adding 200 μL of QC check sample concentrate to 100 mL of reagent water.

8.2.3 Analyze four 5-mL aliquots of the well-mixed QC check sample according to Section 10.

8.2.4 Calculate the average recovery ($\bar{X}$) in μg/L, and the standard deviation of the recovery (s) in μg/L, for each parameter using the four results.

8.2.5 For each parameter compare s and $\bar{X}$ with the corresponding acceptance criteria for precision and accuracy, respectively, found in Table 3. If s and $\bar{X}$ for all parameters of interest meet the acceptance criteria, the system performance is acceptable and analysis of actual samples can begin. If either s exceeds the precision limit or $\bar{X}$ falls outside the range for accuracy, the system performance is unacceptable for that parameter. Locate and correct the source of the problem and repeat the test for each compound of interest.

8.3 The laboratory must, on an ongoing basis, spike at least 10% of the samples from each sample site being monitored to assess accuracy. For laboratories analyzing one to ten samples per month, at least one spiked sample per month is required.

8.3.1 The concentration of the spike in the sample should be determined as follows:

8.3.1.1 If, as in compliance monitoring, the concentration of a specific parameter in the sample is being checked against a regulatory concentration limit, the spike should be at that limit or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.2 If the concentration of a specific parameter in the sample is not being checked against a limit specific to that parameter, the spike should be at 50 μg/L or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.2 Analyze one 5-mL sample aliquot to determine the background concentration (B) of each parameter. If necessary, prepare a new QC check sample concentrate (Section 8.2.1) appropriate for the background concentrations in the sample. Spike a second 5-mL sample aliquot with 10 μL of the QC check sample concentrate and analyze it to determine the concentration after spiking (A) of each parameter. Calculate each percent recovery (P) as 100(A-B)%/T, where T is the known true value of the spike.

8.3.3 Compare the percent recovery (P) for each parameter with the corresponding QC acceptance criteria found in Table 3. These acceptance criteria were calculated to include an allowance for error in measurement of both the background and spike concentrations, assuming a spike to background ratio of 5:1. This error will be accounted for to the extent that the analyst's spike to background ratio approaches 5:1.[7]

8.3.4 If any individual P falls outside the designated range for recovery, that parameter has failed the acceptance criteria. A check standard containing each parameter that failed the criteria must be analyzed as described in Section 8.4.

8.4 If any parameter fails the acceptance criteria for recovery in Section 8.3, a QC check standard containing each parameter that failed must be prepared and analyzed.

NOTE: The frequency for the required analysis of a QC check standard will depend upon the number of parameters being simultaneously tested, the complexity of the sample matrix, and the performance of the laboratory.

8.4.1 Prepare the QC check standard by adding 10 μL of QC check sample concentrate (Section 8.2.1 or 8.3.2) to 5 mL of reagent water. The QC check standard needs only to contain the parameters that failed criteria in the test in Section 8.3.

8.4.2 Analyze the QC check standard to determine the concentration measured (A) of each parameter. Calculate each percent recovery (P_s) as 100 (A/T)%, where T is the true value of the standard concentration.

8.4.3 Compare the percent recovery (P_s) for each parameter with the corresponding QC acceptance criteria found in Table 3. Only parameters that failed the test in Section 8.3 need to be compared with these criteria. If the recovery of any such parameter falls outside the designated range, the laboratory performance for that parameter is judged to be out of control, and the problem must be immediately identified and corrected. The analytical result for that parameter in the unspiked sample is suspect and may not be reported for regulatory compliance purposes.

8.5 As part of the QC program for the laboratory, method accuracy for wastewater samples must be assessed and records must be maintained. After the analysis of five spiked wastewater samples as in Section 8.3, calculate the average percent recovery ($\bar{P}$) and the standard deviation of the percent recovery (s_p). Express the accuracy assessment as a percent recovery interval from $\bar{P}-2s_p$ to $\bar{P}+2s_p$. If $\bar{P}=90\%$ and $s_p=10\%$, for example, the accuracy interval is expressed as 70-110%. Update the accuracy assessment for each parameter on a regular basis (e.g. after each five to ten new accuracy measurements).

8.6 It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Field duplicates may be analyzed to assess the precision of the environmental measurements. When doubt exists over the identification of a peak on the chromatogram, confirmatory techniques such as gas chromatography with a dissimilar column or mass spectrometer must be used. Whenever possible, the laboratory should analyze standard reference materials and participate in relevant performance evaluation studies.

9. Sample Collection, Preservation, and Handling

9.1 All samples must be iced or refrigerated from the time of collection until analysis. If the sample contains free or combined chlorine, add sodium thiosulfate preservative (10 mg/40 mL is sufficient for up to 5 ppm Cl_2) to the empty sample bottle just prior to shipping to the sampling site. EPA Methods 330.4 and 330.5 may be used for measurement of residual chlorine.[8] Field test kits are available for this purpose.

9.2 If acrolein is to be analyzed, collect about 500 mL of sample in a clean glass container. Adjust the pH of the sample to 4 to 5 using acid or base, measuring with narrow range pH paper. Samples for acrolein analysis receiving no pH adjustment must be analyzed within 3 days of sampling.

9.3 Grab samples must be collected in glass containers having a total volume of at least 25 mL. Fill the sample bottle just to overflowing in such a manner that no air bubbles pass through the sample as the bottle is being filled. Seal the bottle so that no air bubbles are entrapped in it. If preservative has been added, shake vigorously for 1 min. Maintain the hermetic seal on the sample bottle until time of analysis.

9.4 All samples must be analyzed within 14 days of collection.[3]

10. Procedure

10.1 Table 1 summarizes the recommended operating conditions for the gas chromatograph. Included in this table are estimated retention times and MDL that can be achieved under these conditions. An example of the separations achieved by Column 1 is shown in Figure 5. Other packed columns, chromatographic conditions, or detectors may be used if the requirements of Section 8.2 are met.

10.2 Calibrate the system daily as described in Section 7.

10.3 Adjust the purge gas (nitrogen or helium) flow rate to 20 mL-min. Attach the trap inlet to the purging device, and set the purge and trap system to purge (Figure 3). Open the syringe valve located on the purging device sample introduction needle.

10.4 Remove the plunger from a 5-mL syringe and attach a closed syringe valve. Open the sample bottle (or standard) and carefully pour the sample into the syringe barrel to just short of overflowing. Replace the syringe plunger and compress the sample. Open the syringe valve and vent any residual air while adjusting the sample volume to 5.0 mL. Since this process of taking an aliquot destroys the validity of the sample for future analysis, the analyst should fill a second syringe at this time to protect against possible loss of data. Add 10.0 μL of the internal standard spiking solution (Section 7.4.2), if applicable, through the valve bore then close the valve.

10.5 Attach the syringe-syringe valve assembly to the syringe valve on the purging device. Open the syringe valves and inject the sample into the purging chamber.

10.6 Close both valves and purge the sample for 15.0 ± 0.1 min while heating at 85 ± 2 °C.

10.7 After the 15-min purge time, attach the trap to the chromatograph, adjust the purge and trap system to the desorb mode (Figure 4), and begin to temperature program the gas chromatograph. Introduce the trapped materials to the GC column by rapidly heating the trap to 180 °C while backflushing the trap with an inert gas between 20 and 60 mL/min for 1.5 min.

10.8 While the trap is being desorbed into the gas chromatograph, empty the purging chamber using the sample introduction syringe. Wash the chamber with two 5-mL flushes of reagent water.

10.9 After desorbing the sample for 1.5 min, recondition the trap by returning the purge and trap system to the purge mode. Wait 15 s then close the syringe valve on the purging device to begin gas flow through the trap. The trap temperature should be maintained at 210 °C. After approximately 7 min, turn off the trap heater and open the syringe valve to stop the gas flow through the trap. When the trap is cool, the next sample can be analyzed.

10.10 Identify the parameters in the sample by comparing the retention times of the peaks in the sample chromatogram with those of the peaks in standard chromatograms. The width of the retention time window used to make identifications should be based upon measurements of actual retention time variations of standards over the course of a day. Three times the standard deviation of a retention time for a compound can be used to calculate a suggested window size; however, the experience of the analyst should weigh heavily in the interpretation of chromatograms.

11. Calculations

11.1 Determine the concentration of individual compounds in the sample.

11.1.1 If the external standard calibration procedure is used, calculate the concentration of the parameter being measured from the peak response using the calibration curve or calibration factor determined in Section 7.3.2.

11.1.2 If the internal standard calibration procedure is used, calculate the concentration in the sample using the response factor (RF) determined in Section 7.4.3 and Equation 2.

$$\text{Concentration } (\mu g/L) = \frac{(A_s)(C_{is})}{(A_{is})(RF)}$$

Equation 2

where:

A_s=Response for the parameter to be measured.

A_{is}=Response for the internal standard.

C_{is}=Concentration of the internal standard.

11.2 Report results in μg/L without correction for recovery data. All QC data obtained should be reported with the sample results.

12. Method Performance

12.1 The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero.[1] The MDL concentrations listed in Table 1 were obtained using reagent water.[9] The MDL actually achieved in a given analysis will vary depending on instrument sensitivity and matrix effects.

12.2 This method is recommended for the concentration range from the MDL to 1,000×MDL. Direct aqueous injection techniques should be used to measure concentration levels above 1,000×MDL.

12.3 In a single laboratory (Battelle-Columbus), the average recoveries and standard deviations presented in Table 2 were obtained.[9] Seven replicate samples were analyzed at each spike level.

References

1. 40 CFR Part 136, Appendix B.

2. Bellar, T.A., and Lichtenberg, J.J. "Determining Volatile Organics at Microgram-per-Litre-Levels by Gas Chromatography," *Journal American Water Works Association, 66*, 739 (1974).

3. "Evaluate Test Procedures for Acrolein and Acrylonitrile," Special letter report for EPA Project 4719-A, U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268, 27 June 1979.

4. "Carcinogens—Working With Carcinogens," Department of Health, Education, and Welfare, Public Health Service, Center for Disease Control, National Institute for Occupational Safety and Health, Publication No. 77-206, August 1977.

5. "OSHA Safety and Health Standards, General Industry," (29 CFR Part 1910), Occupational Safety and Health Administration, OSHA 2206 (Revised, January 1976).

6. "Safety in Academic Chemistry Laboratories," American Chemical Society Publication, Committee on Chemical Safety, 3rd Edition, 1979.

7. Provost, L.P., and Elder, R.S. "Interpretation of Percent Recovery Data," *American Laboratory, 15*, 58–63 (1983).

8. "Methods 330.4 (Titrimetric, DPD-FAS) and 330.5 (Spectrophotometric, DPD) for Chlorine, Total Residual," Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268, March 1979.

9. "Evaluation of Method 603 (Modified)," EPA-600/4-84-ABC, National Technical Information Service, PB84-, Springfield, Virginia 22161, Nov. 1984.

TABLE 1.—CHROMATOGRAPHIC CONDITIONS AND METHOD DETECTION LIMITS

Parameter	Retention time (min)		Method detection limit (μg/L)
	Column 1	Column 2	
Acrolein	10.6	8.2	0.7
Acrylonitrile	12.7	9.8	0.5

Column 1 conditions: Porapak-QS (80/100 mesh) packed in a 10 ft × 2 mm ID glass or stainless steel column with helium carrier gas at 30 mL/min flow rate. Column temperature held isothermal at 110 °C for 1.5 min (during desorption), then heated as rapidly as possible to 150 °C and held for 20 min; column bakeout at 190 °C for 10 min.[9]

Column 2 conditions: Chromosorb 101 (60/80 mesh packed in a 6 ft. x 0.1 in. ID glass or stainless steel column with helium carrier gas at 40 mL/min flow rate. Column temperature held isothermal at 80°C for 4 min, then programmed at 50°C/min to 120°C and held for 12 min

TABLE 2.—SINGLE LABORATORY ACCURACY AND PRECISION—METHOD 603

Parameter	Sample matrix	Spike conc. (μg/L)	Average recovery (μg/L)	Standard deviation (μg/L)	Average percent recovery
Acrolein	RW	5.0	5.2	0.2	104
	RW	50.0	51.4	0.7	103

TABLE 2.—SINGLE LABORATORY ACCURACY AND PRECISION—METHOD 603—Continued

Parameter	Sample matrix	Spike conc. (μg/L)	Average recovery (μg/L)	Standard deviation (μg/L)	Average percent recovery
Acrylonitrile	POTW	5.0	4.0	0.2	80
	POTW	50.0	44.4	0.8	89
	IW	5.0	0.1	0.1	2
	IW	100.0	9.3	1.1	9
	RW	5.0	4.2	0.2	84
	RW	50.0	51.4	1.5	103
	POTW	20.0	20.1	0.8	100
	POTW	100.0	101.3	1.5	101
	IW	10.0	9.1	0.8	91
	IW	100.0	104.0	3.2	104

RW=Reagent water.
POTW=Prechlorination secondary effluent from a municipal sewage treatment plant.
IW=Industrial wastewater containing an unidentified acrolein reactant.

TABLE 3.—CALIBRATION AND QC ACCEPTANCE CRITERIA—METHOD 603 *

Parameter	Range for Q (μg/L)	Limit for S (μg/L)	Range for $\bar{X}$ (μg/L)	Range for P, P_s (%)
Acrolein	45.9–54.1	4.6	42.9–60.1	88–118
Acrylonitrile	41.2–58.8	9.9	33.1–69.9	71–135

=Criteria were calculated assuming a QC check sample concentration of 50 μg/L.

Q=Concentration measured in QC check sample, in μg/L (Section 7.5.3).

s=Standard deviation of four recovery measurements, in μg/L (Section 8.2.4).

$\bar{X}$=Average recovery for four recovery measurements, in μg/L (Section 8.2.4).

P, P_s=Percent recovery measured (Section 8.3.2, Section 8.4.2).

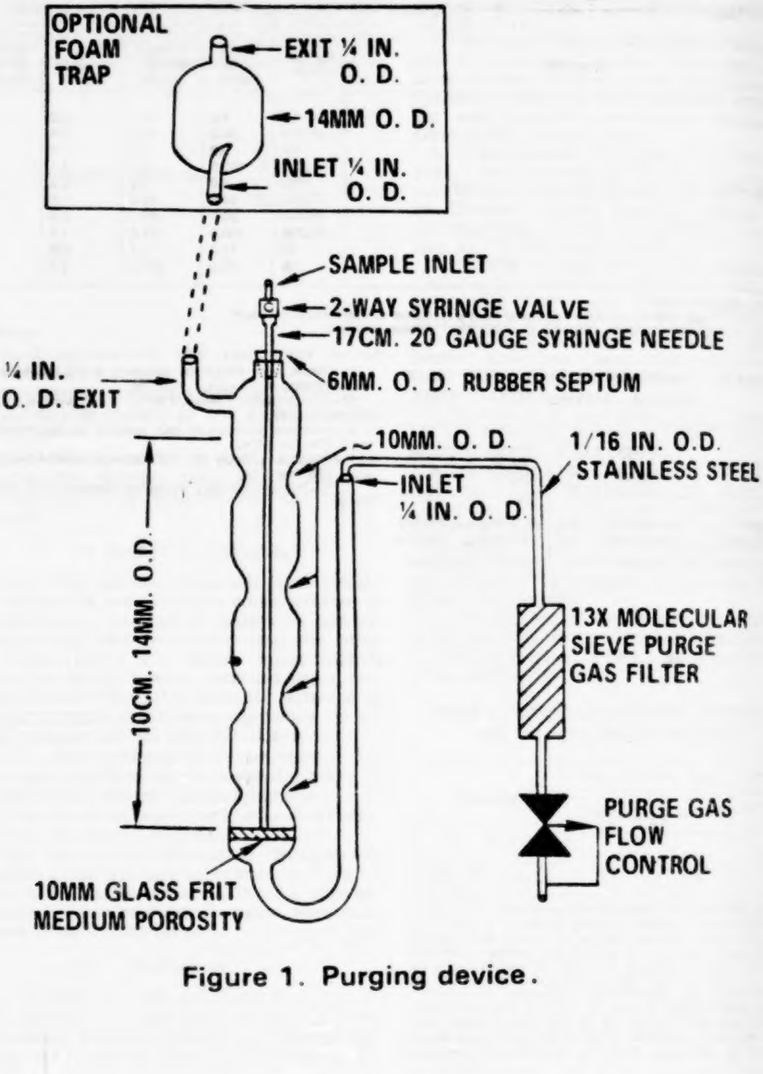
OPTIONAL
FOAM
TRAP
EXIT ¼ IN. O. D.
14MM O. D.
INLET ¼ IN. O. D.
SAMPLE INLET
2-WAY SYRINGE VALVE
17CM. 20 GAUGE SYRINGE NEEDLE
¼ IN. O. D. EXIT
6MM. O. D. RUBBER SEPTUM
~10MM. O. D.
1/16 IN. O.D. STAINLESS STEEL
INLET ¼ IN. O. D.
10CM. 14MM. O.D.
13X MOLECULAR SIEVE PURGE GAS FILTER
PURGE GAS FLOW CONTROL
10MM GLASS FRIT MEDIUM POROSITY

Figure 1. Purging device.

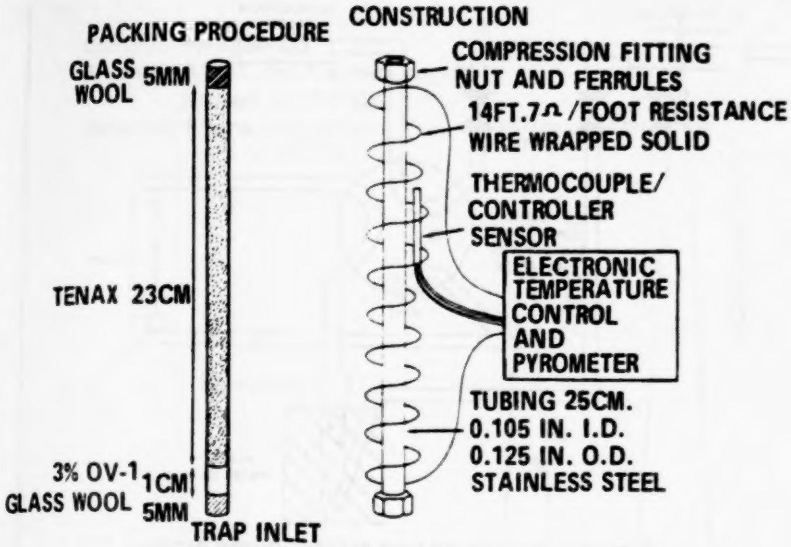
PACKING PROCEDURE
GLASS WOOL
5MM
TENAX 23CM
3% OV-1
1CM
GLASS WOOL
5MM
TRAP INLET
CONSTRUCTION
COMPRESSION FITTING NUT AND FERRULES
14FT.7Ω/FOOT RESISTANCE WIRE WRAPPED SOLID
THERMOCOUPLE/ CONTROLLER SENSOR
ELECTRONIC TEMPERATURE CONTROL AND PYROMETER
TUBING 25CM. 0.105 IN. I.D. 0.125 IN. O.D. STAINLESS STEEL

Figure 2. Trap packings and construction to include desorb capability.

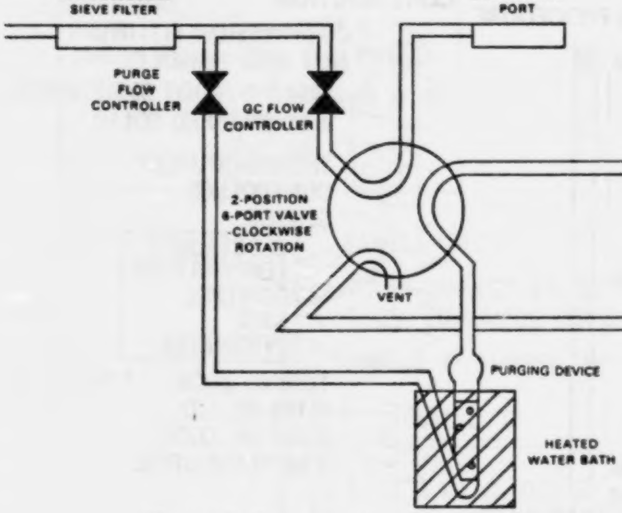
13X MOLECULAR SIEVE FILTER
GC INJECTION PORT
PURGE FLOW CONTROLLER
GC FLOW CONTROLLER
2-POSITION 6-PORT VALVE -CLOCKWISE ROTATION
TRAP
VENT
PURGING DEVICE
HEATED WATER BATH

Figure 3. Purge and trap system-purge mode.

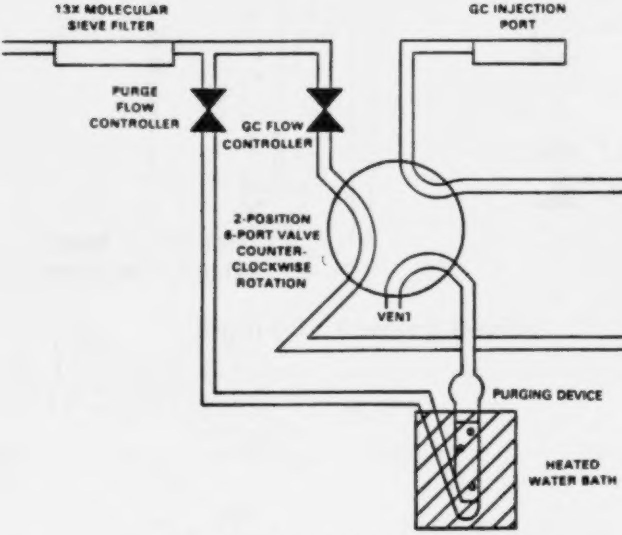
13X MOLECULAR SIEVE FILTER
GC INJECTION PORT
PURGE FLOW CONTROLLER
GC FLOW CONTROLLER
2-POSITION 6-PORT VALVE COUNTER-CLOCKWISE ROTATION
TRAP
VENT
PURGING DEVICE
HEATED WATER BATH

Figure 4. Purge and trap system-desorb mode.

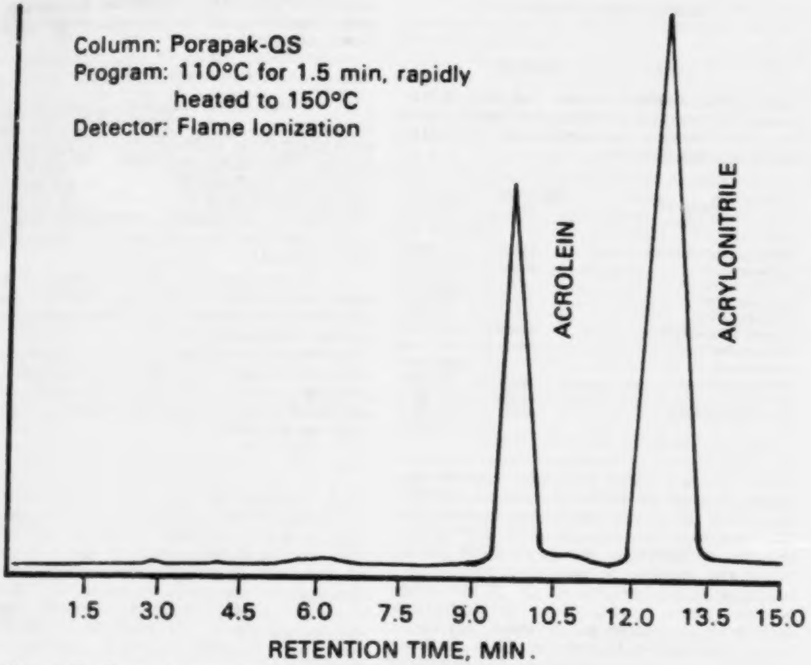

Figure 5. Gas chromatogram of acrolein and acrylonitrile.

METHOD 604—PHENOLS

1. Scope and Application

1.1 This method covers the determination of phenol and certain substituted phenols. The following parameters may be determined by this method:

Parameter	STORET No.	CAS No.
4-Chloro-3-methylphenol	34452	59-50-7
2-Chlorophenol	34586	95-57-8
2,4-Dichlorophenol	34601	120-83-2
2,4-Dimethylphenol	34606	105-67-9
2,4-Dinitrophenol	34616	51-28-5
2-Methyl-4,6-dinitrophenol	34657	534-52-1
2-Nitrophenol	34591	88-75-5
4-Nitrophenol	34646	100-02-7
Pentachlorophenol	39032	87-86-5
Phenol	34694	108-95-2
2,4,6-Trichlorophenol	34621	88-06-2

1.2 This is a flame ionization detector gas chromatographic (FIDGC) method applicable to the determination of the compounds listed above in municipal and industrial discharges as provided under 40 CFR 136.1. When this method is used to analyze unfamiliar samples for any or all of the compounds above, compound identifications should be supported by at least one additional qualitative technique. This method describes analytical conditions for derivatization, cleanup, and electron capture detector gas chromatography (ECDGC) that can be used to confirm measurements made by FIDGC. Method 625 provides gas chromatograph/mass spectrometer (GC/MS) conditions appropriate for the qualitative and quantitative confirmation of results for all of the parameters listed above, using the extract produced by this method.

1.3 The method detection limit (MDL, defined in Section 14.1) [1] for each parameter is listed in Table 1. The MDL for a specific wastewater may differ from those listed, depending upon the nature of interferences in the sample matrix. The MDL listed in Table 1 for each parameter was achieved with a flame ionization detector (FID). The MDLs that were achieved when the derivatization cleanup and electron capture detector (ECD) were employed are presented in Table 2.

1.4 Any modification of this method, beyond those expressly permitted, shall be considered as a major modification subject to application and approval of alternate test procedures under 40 CFR 136.4 and 136.5.

1.5 This method is restricted to use by or under the supervision of analysts experienced in the use of a gas chromatograph and in the interpretation of gas chromatograms. Each analyst must demonstrate the ability to generate acceptable results with this method using the procedure described in Section 8.2.

2. Summary of Method

2.1 A measured volume of sample, approximately 1-L, is acidified and extracted with methylene chloride using a separatory funnel. The methylene chloride extract is dried and exchanged to 2-propanol during concentration to a volume of 10 mL or less. The extract is separated by gas chromatography and the phenols are then measured with an FID.[2]

2.2 A preliminary sample wash under basic conditions can be employed for samples having high general organic and organic base interferences.

2.3 The method also provides for a derivatization and column chromatography cleanup procedure to aid in the elimination of interferences.[2,3] The derivatives are analyzed by ECDGC.

3. Interferences

3.1 Method interferences may be caused by contaminants in solvents, reagents, glassware, and other sample processing hardware that lead to discrete artifacts and/or elevated baselines in gas chromatograms. All of these materials must be routinely demonstrated to be free from interferences under the conditions of the analysis by running laboratory reagent blanks as described in Section 8.1.3.

3.1.1 Glassware must be scrupulously cleaned.[4] Clean all glassware as soon as possible after use by rinsing with the last solvent used in it. Solvent rinsing should be followed by detergent washing with hot water, and rinses with tap water and distilled water. The glassware should then be drained dry, and heated in a muffle furnace at 400 °C for 15 to 30 min. Some thermally stable materials, such as PCBs, may not be eliminated by this treatment. Solvent rinses with acetone and pesticide quality hexane may be substituted for the muffle furnace heating. Thorough rinsing with such solvents usually eliminates PCB interference. Volumetric ware should not be heated in a muffle furnace. After drying and cooling, glassware should be sealed and stored in a clean environment to prevent any accumulation of dust or other contaminants. Store inverted or capped with aluminum foil.

3.1.2 The use of high purity reagents and solvents helps to minimize interference problems. Purification of solvents by distillation in all-glass systems may be required.

3.2 Matrix interferences may be caused by contaminants that are coextracted from the sample. The extent of matrix interferences will vary considerably from source to source, depending upon the nature and diversity of the industrial complex or municipality being sampled. The derivatization cleanup procedure in Section 12 can be used to overcome many of these interferences, but unique samples may require additional cleanup approaches to achieve the MDL listed in Tables 1 and 2.

3.3 The basic sample wash (Section 10.2) may cause significantly reduced recovery of phenol and 2,4-dimethylphenol. The analyst must recognize that results obtained under these conditions are minimum concentrations.

4. Safety

4.1 The toxicity or carcinogenicity of each reagent used in this mothod has not been precisely defined; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material data handling sheets should also be made available to all personnel involved in the chemical analysis. Additional references to laboratory safety are available and have been identified [5-7] for the information of analyst.

4.2 Special care should be taken in handling pentafluorobenzyl bromide, which is a lachrymator, and 18-crown-6-ether, which is highly toxic.

5. Apparatus and Materials

5.1 Sampling equipment, for discrete or composite sampling.

5.1.1 Grab sample bottle—1-L or 1-qt, amber glass, fitted with a screw cap lined with Teflon. Foil may be substituted for Teflon if the sample is not corrosive. If amber bottles are not available, protect samples from light. The bottle and cap liner must be washed, rinsed with acetone or methylene chloride, and dried before use to minimize contamination.

5.1.2 Automatic sampler (optional)—The sampler must incorporate glass sample containers for the collection of a minimum of 250 mL of sample. Sample containers must be kept refrigerated at 4 °C and protected from light during compositing. If the sampler uses a peristaltic pump, a minimum length of compressible silicone rubber tubing may be used. Before use, however, the compressible tubing should be thoroughly rinsed with methanol, followed by repeated rinsings with distilled water to minimize the potential for contamination of the sample. An integrating flow meter is required to collect flow proportional composites.

5.2 Glassware (All specifications are suggested. Catalog numbers are included for illustration only.):

5.2.1 Separatory funnel—2-L, with Teflon stopcock.

5.2.2 Drying column—Chromatographic column, 400 mm long x 19 mm ID, with coarse frit filter disc.

5.2.3 Chromatographic column—100 mm long x 10 mm ID, with Teflon stopcock.

5.2.4 Concentrator tube, Kuderna-Danish—10-mL, graduated (Kontes K-570050-1025 or equivalent). Calibration must be checked at the volumes employed in the test. Ground glass stopper is used to prevent evaporation of extracts.

5.2.5 Evaporative flask, Kuderna-Danish—500-mL (Kontes K-570001-0500 or equivalent). Attach to concentrator tube with springs.

5.2.6 Snyder column, Kuderna-Danish—Three-ball macro (Kontes K-503000-0121 or equivalent).

5.2.7 Snyder column, Kuderna-Danish—Two-ball micro (Kontes K-569001-0219 or equivalent).

5.2.8 Vials—10 to 15-mL, amber glass, with Teflon-lined screw cap.

5.2.9 Reaction flask—15 to 25-mL round bottom flask, with standard tapered joint, fitted with a water-cooled condenser and U-shaped drying tube containing granular calcium chloride.

5.3 Boiling chips—Approximately 10/40 mesh. Heat to 400 °C for 30 min or Soxhlet extract with methylene chloride.

5.4 Water bath—Heated, with concentric ring cover, capable of temperature control (±2 °C). The bath should be used in a hood.

5.5 Balance—Analytical, capable of accurately weighting 0.0001 g.

5.6 Gas chromatograph—An analytical system complete with a temperature programmable gas chromatograph suitable for on-column injection and all required accessories including syringes, analytical columns, gases, detector, and strip-chart recorder. A data system is recommended for measuring peak areas.

5.6.1 Column for underivatized phenols—1.8 m long x 2 mm ID glass, packed with 1% SP-1240DA on Supelcoport (80/100 mesh) or equivalent. This column was used to develop the method performance statements in Section 14. Guidelines for the use of alternate column packings are provided in Section 11.1.

5.6.2 Column for derivatized phenols—1.8 m long x 2 mm ID glass, packed with 5% OV-17 on Chromosorb W-AW-DMCS (80/100 mesh) or equivalent. This column has proven effective in the analysis of wastewaters for derivatization products of the parameters listed in the scope (Section 1.1), and was used to develop the method performance statements in Section 14.

Guidelines for the use of alternate column packings are provided in Section 11.1.

5.6.3 Detectors—Flame ionization and electron capture detectors. The FID is used when determining the parent phenols. The ECD is used when determining the derivatized phenols. Guidelines for the use of alternatve detectors are provided in Section 11.1.

6. Reagents

6.1 Reagent water—Reagent water is defined as a water in which an interferent is not observed at the MDL of the parameters of interest.

6.2 Sodium hydroxide solution (10 N)—Dissolve 40 g of NaOH (ACS) in reagent water and dilute to 100 mL.

6.3 Sodium hydroxide solution (1 N)—Dissolve 4 g of NaOH (ACS) in reagent water and dilute to 100 mL.

6.4 Sodium sulfate—(ACS) Granular, anhydrous. Purify by heating at 400°C for 4 h in a shallow tray.

6.5 Sodium thiosulfate—(ACS) Granular.

6.6 Sulfuric acid (1+1)—Slowly, add 50 mL of H_2SO_4 (ACS, sp. gr. 1.84) to 50 mL of reagent water.

6.7 Sulfuric acid (1 N)—Slowly, add 58 mL of H_2SO_4 (ACS, sp. gr. 1.84) to reagent water and dilute to 1 L.

6.8 Potassium carbonate—(ACS) Powdered.

6.9 Pentafluorobenzyl bromide (α-Bromopentafluorotoluene)—97% minimum purity.

NOTE: This chemical is a lachrymator. (See Section 4.2.)

6.10 18-crown-6-ether (1,4,7,10,13,16-Hexaoxacyclooctadecane)—98% minimum purity.

NOTE: This chemical is highly toxic.

6.11 Derivatization reagent—Add 1 mL of pentafluorobenzyl bromide and 1 g of 18-crown-6-ether to a 50-mL volumetric flask and dilute to volume with 2-propanol. Prepare fresh weekly. This operation should be carried out in a hood. Store at 4 °C and protect from light.

6.12 Acetone, hexane, methanol, methylene chloride, 2-propanol, toluene—Pesticide quality or equivalent.

6.13 Silica gel—100/200 mesh, Davison, grade-923 or equivalent. Activate at 130 °C overnight and store in a desiccator.

6.14 Stock standard solutions (1.00 μg/μL)—Stock standard solutions may be prepared from pure standard materials or purchased as certified solutions.

6.14.1 Prepare stock standard solutions by accurately weighing about 0.0100 g of pure material. Dissolve the material in 2-propanol and dilute to volume in a 10-mL volumetric flask. Larger volumes can be used at the convenience of the analyst. When compound purity is assayed to be 96% or greater, the weight can be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards can be used at any concentration if they are certified by the manufacturer or by an independent source.

6.14.2 Transfer the stock standard solutions into Teflon-sealed screw-cap bottle Store at 4 °C and protect from light. Stoc standard solutions should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

6.14.3 Stock standard solutions must b replaced after six months, or sooner if comparison with check standards indicates problem.

6.15 Quality control check sample concentrate—See Section 8.2.1.

7. Calibration

7.1 To calibrate the FIDGC for the a aylsis of underivatized phenols, establis gas chromatographic operating condition equivalent to those given in Table 1. Th gas chromatographic system can be calibrated using the external standard techniqu (Section 7.2) or the internal standard technique (Section 7.3).

7.2 External standard calibration procedure for FIDGC:

7.2.1 Prepare calibration standards at a minimum of three concentration levels f each parameter of interest by adding volunes of one or more stock standards to a volumetric flask and diluting to volume wi 2-propanol. One of the external standar should be at a concentration near, b above, the MDL (Table 1) and the othe concentrations should correspond to the expected range of concentrations found in re samples or should define the working rang of the detector.

7.2.2 Using injections of 2 to 5 μl, analyz each calibration standard according to Section 11 and tabulate peak height or area responses against the mass injected. The results can be used to prepare a calibrati curve for each compound. Alternatively, i the ratio of response to amount injecte (calibration factor) is a constant over th working range (<10% relative standard deviation, RSD), linearity through the origi can be assumed and the average ratio o calibration factor can be used in place of t calibration curve.

7.3 Internal standard calibration procedure for FIDGC—To use this approach, th analyst must select one or more intern standards that are similar in analytical behavior to the compounds of interest. Th analyst must further demonstrate that th measurement of the internal standard is no affected by method or matrix interferenc Because of these limitations, no intern standard can be suggested that is applica to all samples.

7.3.1 Prepare calibration standards at a minimum of three concentration levels for each parameter of interest by adding volumes of one or more stock standards to a volumetric flask. To each calibration standard, add a known constant amount of one or more internal standards, and dilute to volume with 2-propanol. One of the standards should be at a concentration near, but above, the MDL and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the detector.

7.3.2 Using injections of 2 to 5 μL, analyze each calibration standard according to Section 11 and tabulate peak height or area responses against concentration for each compound and internal standard. Calculate response factors (RF) for each compound using Equation 1.

$$RF = \frac{(A_s)(C_{is})}{(A_{is})(C_s)}$$

Equation 1

where:

A_s=Response for the parameter to be measured.

A_{is}=Response for the internal standard.

C_{is}=Concentration of the internal standard (μg/L).

C_s=Concentration of the parameter to be measured (μg/L).

If the RF value over the working range is a constant (<10% RSD), the RF can be assumed to be invariant and the average RF can be used for calculations. Alternatively, the results can be used to plot a calibration curve of response ratios, A_s/A_{is}, vs. RF.

7.4 The working calibration curve, calibration factor, or RF must be verified on each working day by the measurement of one or more calibration standards. If the response for any parameter varies from the predicted response by more than ±15%, a new calibration curve must be prepared for that compound.

7.5 To calibrate the ECDGC for the analysis of phenol derivatives, establish gas chromatographic operating conditions equivalent to those given in Table 2.

7.5.1 Prepare calibration standards at a minimum of three concentration levels for each parameter of interest by adding volumes of one or more stock standards to a volumetric flask and diluting to volume with 2-propanol. One of the external standards should be at a concentration near, but above, the MDL (Table 2) and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the detector.

7.5.2 Each time samples are to be derivatized, simultaneously treat a 1-mL aliquot of each calibration standard as described in Section 12.

7.5.3 After derivatization, analyze 2 to 5 μL of each column eluate collected according to the method beginning in Section 12.8 and tabulate peak height or area responses against the calculated equivalent mass of underivatized phenol injected. The results can be used to prepare a calibration curve for each compound.

7.6 Before using any cleanup procedure, the analyst must process a series of calibration standards through the procedure to validate elution patterns and the absence of interferences from the reagents.

8. Quality Control

8.1 Each laboratory that uses this method is required to operate a formal quality control program. The minimum requirements of this program consist of an initial demonstration of laboratory capability and an ongoing analysis of spiked samples to evaluate and document data quality. The laboratory must maintain records to document the quality of data that is generated. Ongoing data quality checks are compared with established performance criteria to determine if the results of analyses meet the performance characteristics of the method. When results of sample spikes indicate atypical method performance, a quality control check standard must be analyzed to confirm that the measurements were performed in an in-control mode of operation.

8.1.1 The analyst must make an initial, one-time, demonstration of the ability to generate acceptable accuracy and precision with this method. This ability is established as described in Section 8.2.

8.1.2 In recognition of advances that are occurring in chromatography, the analyst is permitted certain options (detailed in Sections 10.6 and 11.1) to improve the separations or lower the cost of measurements. Each time such a modification is made to the method, the analyst is required to repeat the procedure in Section 8.2.

8.1.3 Before processing any samples the analyst must analyze a reagent water blank to demonstrate that interferences from the analytical system and glassware are under control. Each time a set of samples is extracted or reagents are changed a reagent water blank must be processed as a safeguard against laboratory contamination.

8.1.4 The laboratory must, on an ongoing basis, spike and analyze a minimum of 10% of all samples to monitor and evaluate laboratory data quality. This procedure is described in Section 8.3.

8.1.5 The laboratory must, on an ongoing basis, demonstrate through the analyses of quality control check standards that the operation of the measurement system is in control. This procedure is described in Section 8.4. The frequency of the check standard analyses is equivalent to 10% of all samples analyzed but may be reduced if spike recoveries from samples (Section 8.3) meet all specified quality control criteria.

8.1.6 The laboratory must maintain performance records to document the quality of data that is generated. This procedure is described in Section 8.5.

8.2 To establish the ability to generate acceptable accuracy and precision, the analyst must perform the following operations.

8.2.1 A quality control (QC) check sample concentrate is required containing each parameter of interest at a concentration of 100 μg/mL in 2-propanol. The QC check sample concentrate must be obtained from the U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory in Cincinnati, Ohio, if available. If not available from that source, the QC check sample concentrate must be obtained from another external source. If not available from either source above, the QC check sample concentrate must be prepared by the laboratory using stock standards prepared independently from those used for calibration.

8.2.2 Using a pipet, prepare QC check samples at a concentration of 100 μg/L by adding 1.00 mL of QC check sample concentrate to each of four 1-L aliquots of reagent water.

8.2.3 Analyze the well-mixed QC check samples according to the method beginning in Section 10.

8.2.4 Calculate the average recovery ($\bar{X}$) in μg/L, and the standard deviation of the recovery (s) in μg/L, for each parameter using the four results.

8.2.5 For each parameter compare s and $\bar{X}$ with the corresponding acceptance criteria for precision and accuracy, respectively, found in Table 3. If s and $\bar{X}$ for all parameters of interest meet the acceptance criteria, the system performance is acceptable and analysis of actual samples can begin. If any individual s exceeds the precision limit or any individual $\bar{X}$ falls outside the range for accuracy, the system performance is unacceptable for that parameter.

NOTE: The large number of parameters in Talbe 3 present a substantial probability that one or more will fail at least one of the acceptance criteria when all parameters are analyzed.

8.2.6 When one or more of the parameters tested fail at least one of the acceptance criteria, the analyst must proceed according to Section 8.2.6.1 or 8.2.6.2.

8.2.6.1 Locate and correct the source of the problem and repeat the test for all parameters of interest beginning with Section 8.2.2.

8.2.6.2 Beginning with Section 8.2.2 repeat the test only for those parameters that failed to meet criteria. Repeated failure, however, will confirm a general problem with the measurement system. If this occurs, locate and correct the source of the problem and repeat the test for all compounds of interest beginning with Section 8.2.2.

8.3 The laboratory must, on an ongoing basis, spike at least 10% of the samples from each sample site being monitored to assess accuracy. For laboratories analyzing one to ten samples per month, at least one spiked sample per month is required.

8.3.1 The concentration of the spike in the sample should be determined as follows:

8.3.1.1 If, as in compliance monitoring, the concentration of a specific parameter in the sample is being checked against a regulatory concentration limit, the spike should be at that limit or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.2 If the concentration of a specific parameter in the sample is not being checked against a limit specific to that parameter, the spike should be at 100 μg/L or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.3 If it is impractical to determine background levels before spiking (e.g., maximum holding times will be exceeded), the spike concentration should be (1) the regulatory concentration limit, if any, or, if none, (2) the larger of either 5 times higher than the expected background concentration or 100 μg/L.

8.3.2 Analyze one sample aliquot to determine the background concentration (B) of each parameter. If necessary, prepare a new QC check sample concentrate (Section 8.2.1) appropriate for the background concentrations in the sample. Spike a second sample aliquot with 1.0 mL of the QC check sample concentrate and analyze it to determine the concentration after spiking (A) of each parameter. Calculate each percent recovery (P) as 100(A-B)%/T, where T is the known true value of the spike.

8.3.3 Compare the percent recovery (P) for each parameter with the corresponding QC acceptance criteria found in Table 3. These acceptance criteria were calculated to include an allowance for error in measurement of both the background and spike concentrations, assuming a spike to background ratio of 5:1. This error will be accounted for to the extent that the analyst's spike to background ratio approaches 5:1.[8] If spiking was performed at a concentration lower than 100 μg/L, the analyst must use either the QC acceptance criteria in Table 3, or optional QC acceptance criteria calculated for the specific spike concentration. To calculate optional acceptance criteria for the recovery of a parameter: (1) Calculate accuracy (X') using the equation in Table 4, substituting the spike concentration (T) for C; (2) calculate overall precision (S') using the equation in Table 4, substituting X' for $\bar{X}$; (3) calculate the range for recovery at the spike concentration as $(100\ X'/T) \pm 2.44(100\ S'/T)\%$.[8]

8.3.4 If any individual P falls outside the designated range for recovery, that parameter has failed the acceptance criteria. A check standard containing each parameter that failed the criteria must be analyzed as described in Section 8.4.

8.4 If any parameter fails the acceptance criteria for recovery in Section 8.3, a QC check standard containing each parameter that failed must be prepared and analyzed.

NOTE: The frequency for the required analysis of a QC check standard will depend upon the number of parameters being simultaneously tested, the complexity of the sample matrix, and the performance of the laboratory.

8.4.1 Prepare the QC check standard by adding 1.0 mL of QC check sample concentrate (Section 8.2.1 or 8.3.2) to 1 L of reagent water. The QC check standard needs only to contain the parameters that failed criteria in the test in Section 8.3.

8.4.2 Analyze the QC check standard to determine the concentration measured (A) of each parameter. Calculate each percent recovery (P_s) as 100 (A/T)%, where T is the true value of the standard concentration.

8.4.3 Compare the percent recovery (P_s) for each parameter with the corresponding QC acceptance criteria found in Table 3. Only parameters that failed the test in Section 8.3 need to be compared with these criteria. If the recovery of any such parameter falls outside the designated range, the laboratory performance for that parameter is judged to be out of control, and the problem must be immediately identified and corrected. The analytical result for that parameter in the unspiked sample is suspect and may not be reported for regulatory compliance purposes.

8.5 As part of the QC program for the laboratory, method accuracy for wastewater samples must be assessed and records must be maintained. After the analysis of five spiked wastewater samples as in Section 8.3, calculate the average percent recovery ($\bar{P}$) and the standard deviation of the percent recovery (s_p). Express the accuracy assessment as a percent recovery interval from $\bar{P}-2s_p$ to $\bar{P}+2s_p$. If $\bar{P}=90\%$ and $s_p=10\%$, for example, the accuracy interval is expressed as 70-110%. Update the accuracy assessment for each parameter on a regular basis (e.g. after each five to ten new accuracy measurements).

8.6. It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Field duplicates may be analyzed to assess the precision of the environmental measurements. When doubt exists over the identification of a peak on the chromatogram, confirmatory techniques such as gas chromatography with a dissimilar column, specific element detector, or mass spectrometer must be used. Whenever possible, the laboratory should analyze standard reference materials and participate in relevant performance evaluation studies.

9. Sample Collection, Preservation, and Handling

9.1 Grab samples must be collected in glass containers. Conventional sampling practices[9] should be followed, except that the bottle must not be prerinsed with sample before collection. Composite samples should be collected in refrigerated glass containers in accordance with the requirements of the program. Automatic sampling equipment must be as free as possible of Tygon tubing and other potential sources of contamination.

9.2 All samples must be iced or refrigerated at 4 °C from the time of collection until extraction. Fill the sample bottles and, if residual chlorine is present, add 80 mg of sodium thiosulfate per liter of sample and mix well. EPA Methods 330.4 and 330.5 may be used for measurement of residual chlorine.[10] Field test kits are available for this purpose.

9.3 All samples must be extracted within 7 days of collection and completely analyzed within 40 days of extraction.[2]

10. Sample Extraction

10.1 Mark the water meniscus on the side of sample bottle for later determination of sample volume. Pour the entire sample into a 2-L separatory funnel.

10.2 For samples high in organic content, the analyst may solvent wash the sample at basic pH as prescribed in Sections 10.2.1 and 10.2.2 to remove potential method interferences. Prolonged or exhaustive contact with solvent during the wash may result in low recovery of some of the phenols, notably phenol and 2,4-dimethylphenol. For relatively clean samples, the wash should be omitted and the extraction, beginning with Section 10.3, should be followed.

10.2.1 Adjust the pH of the sample to 12.0 or greater with sodium hydroxide solution.

10.2.2 Add 60 mL of methylene chloride to the sample by shaking the funnel for 1 min with periodic venting to release excess pressure. Discard the solvent layer. The wash can be repeated up to two additional times if significant color is being removed.

10.3 Adjust the sample to a pH of 1 to 2 with sulfuric acid.

10.4 Add 60 mL of methylene chloride to the sample bottle, seal, and shake 30 s to rinse the inner surface. Transfer the solvent to the separatory funnel and extract the sample by shaking the funnel for 2 min. with periodic venting to release excess pressure. Allow the organic layer to separate from the water phase for a minimum of 10 min. If the emulsion interface between layers is more than one-third the volume of the solvent layer, the analyst must employ mechanical techniques to complete the phase separation. The optimum technique depends upon the sample, but may include stirring, filtration of the emulsion through glass wool, centrifugation, or other physical methods. Collect the methylene chloride extract in a 250-mL Erlenmeyer flask.

10.5 Add a second 60-mL volume of methylene chloride to the sample bottle and repeat the extraction procedure a second time, combining the extracts in the Erlenmeyer flask. Perform a third extraction in the same manner.

10.6 Assemble a Kuderna-Danish (K-D) concentrator by attaching a 10-mL concentrator tube to a 500-mL evaporative flask. Other concentration devices or techniques may be used in place of the K-D concentrator if the requirements of Section 8.2 are met.

10.7 Pour the combined extract through a solvent-rinsed drying column containing about 10 cm of anhydrous sodium sulfate, and collect the extract in the K-D concentrator. Rinse the Erlenmeyer flask and column with 20 to 30 mL of methylene chloride to complete the quantitative transfer.

10.8 Add one or two clean boiling chips to the evaporative flask and attach a three-ball Snyder column. Prewet the Snyder column by adding about 1 mL of methylene chloride to the top. Place the K-D apparatus on a hot water bath (60 to 65 °C) so that the concentrator tube is partially immersed in the hot water, and the entire lower rounded surface of the flask is bathed with hot vapor. Adjust the vertical position of the apparatus and the water temperature as required to complete the concentration in 15 to 20 min. At the proper rate of distillation the balls of the column will actively chatter but the chambers will not flood with condensed solvent. When the apparent volume of liquid reaches 1 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 min.

10.9 Increase the temperature of the hot water bath to 95 to 100 °C. Remove the Synder column and rinse the flask and lower joint into the concentrator tube w 1 to 2 mL of 2-propanol. A 5-mL syring recommended for this operation. Attach two-ball micro-Snyder column to the c centrator tube and prewet the column adding about 0.5 mL of 2-propanol to t top. Place the micro-K-D apparatus on t water bath so that the concentrator tube partially immersed in the hot water. Adj the vertical position of the apparatus a the water temperature as required to co plete concentration in 5 to 10 min. At t proper rate of distillation the balls of t column will actively chatter but the cha bers will not flood. When the appare volume of liquid reaches 2.5 mL, remove t K-D apparatus and allow it to drain a cool for at least 10 min. Add an additiona mL of 2-propanol through the top of t micro-Snyder column and resume conce trating as before. When the appare volume of liquid reaches 0.5 mL, remove t K-D apparatus and allow it to drain a cool for at least 10 min.

10.10 Remove the micro-Snyder colum and rinse its lower joint into the concentr tor tube with a minimum amount of 2-pr panol. Adjust the extract volume to 1.0 m Stopper the concentrator tube and store r frigerated at 4 °C if further processing w not be performed immediately. If the e tract will be stored longer than two days, should be transferred to a Teflon-seale screw-cap vial. If the sample extract r quires no further cleanup, proceed wi FIDGC analysis (Section 11). If the sampl requires further cleanup, proceed to Sectio 12.

10.11 Determine the original samp volume by refilling the sample bottle to th mark and transferring the liquid to a 100 mL graduated cylinder. Record the samp volume to the nearest 5 mL.

11. Flame Ionization Detector Gas Chromatography

11.1 Table 1 summarizes the recommend ed operating conditions for the gas chr matograph. Included in this table are rete tion times and MDL that can be achieve under these conditions. An example of th separations achieved by this column i shown in Figure 1. Other packed or capi lary (open-tubular) columns, chromatogr phic conditions, or detectors may be used the requirements of Section 8.2 are met.

11.2 Calibrate the system daily as de scribed in Section 7.

11.3 If the internal standard calibrati procedure is used, the internal standar must be added to the sample extract an mixed thoroughly immediately before inje tion into the gas chromatograph.

11.4 Inject 2 to 5 µL of the sample e tract or standard into the gas chromat graph using the solvent-flush technique.[11] Smaller (1.0 µL) volumes may be injected if automatic devices are employed. Record the volume injected to the nearest 0.05 µL, and the resulting peak size in area or peak height units.

11.5 Identify the parameters in the sample by comparing the retention times of the peaks in the sample chromatogram with those of the peaks in standard chromatograms. The width of the retention time window used to make identifications should be based upon measurements of actual retention time variations of standards over the course of a day. Three times the standard deviation of a retention time for a compound may be used to calculate a suggested window size; however, the experience of the analyst should weigh heavily in the interpretation of chromatograms.

11.6 If the response for a peak exceeds the working range of the system, dilute the extract and reanalyze.

11.7 If the measurement of the peak response is prevented by the presence of interferences, an alternative gas chromatographic procedure is required. Section 12 describes a derivatization and column chromatographic procedure which has been tested and found to be a practical means of analyzing phenols in complex extracts.

12. Derivatization and Electron Capture Detector Gas Chromatography

12.1 Pipet a 1.0-mL aliquot of the 2-propanol solution of standard or sample extract into a glass reaction vial. Add 1.0 mL of derivatizing reagent (Section 6.11). This amount of reagent is sufficient to derivatize a solution whose total phenolic content does not exceed 0.3 mg/mL.

12.2 Add about 3 mg of potassium carbonate to the solution and shake gently.

12.3 Cap the mixture and heat it for 4 h at 80 °C in a hot water bath.

12.4 Remove the solution from the hot water bath and allow it to cool.

12.5 Add 10 mL of hexane to the reaction flask and shake vigorously for 1 min. Add 3.0 mL of distilled, deionized water to the reaction flask and shake for 2 min. Decant a portion of the organic layer into a concentrator tube and cap with a glass stopper.

12.6 Place 4.0 g of silica gel into a chromatographic column. Tap the column to settle the silica gel and add about 2 g of anhydrous sodium sulfate to the top.

12.7 Preelute the column with 6 mL of hexane. Discard the eluate and just prior to exposure of the sodium sulfate layer to the air, pipet onto the column 2.0 mL of the hexane solution (Section 12.5) that contains the derivatized sample or standard. Elute the column with 10.0 mL of hexane and discard the eluate. Elute the column, in order, with: 10.0 mL of 15% toluene in hexane (Fraction 1); 10.0 mL of 40% toluene in hexane (Fraction 2); 10.0 mL of 75% toluene in hexane (Fraction 3); and 10.0 mL of 15% 2-propanol in toluene (Fraction 4). All elution mixtures are prepared on a volume: volume basis. Elution patterns for the phenolic derivatives are shown in Table 2. Fractions may be combined as desired, depending upon the specific phenols of interest or level of interferences.

12.8 Analyze the fractions by ECDGC. Table 2 summarizes the recommended operating conditions for the gas chromatograph. Included in this table are retention times and MDL that can be achieved under these conditions. An example of the separations achieved by this column is shown in Figure 2.

12.9 Calibrate the system daily with a minimum of three aliquots of calibration standards, containing each of the phenols of interest that are derivatized according to Section 7.5.

12.10 Inject 2 to 5 µL of the column fractions into the gas chromatograph using the solvent-flush technique. Smaller (1.0 µL) volumes can be injected if automatic devices are employed. Record the volume injected to the nearest 0.05 µL, and the resulting peak size in area or peak height units. If the peak response exceeds the linear range of the system, dilute the extract and reanalyze.

13. Calculations

13.1 Determine the concentration of individual compounds in the sample analyzed by FIDGC (without derivatization) as indicated below.

13.1.1 If the external standard calibration procedure is used, calculate the amount of material injected from the peak response using the calibration curve or calibration factor determined in Section 7.2.2. The concentration in the sample can be calculated from Equation 2.

$$\text{Concentration } (\mu g/L) = \frac{(A)(V_t)}{(V_i)(V_s)}$$

Equation 2

where:

A = Amount of material injected (ng).
V_i = Volume of extract injected (μL).
V_t = Volume of total extract (μL).
V_s = Volume of water extracted (mL).

13.1.2 If the internal standard calibrati procedure is used, calculate the concent tion in the sample using the response fac (RF) determined in Section 7.3.2 and Equ tion 3.

$$\text{Concentration } (\mu g/L) = \frac{(A_s)(I_s)}{(A_{is})(RF)(V_o)}$$

Equation 3

where:

A_s = Response for the parameter to be measured.
A_{is} = Response for the internal standard.
I_s = Amount of internal standard added to each extract (μg).
V_o = Volume of water extracted (L).

13.2 Determine the concentration of individual compounds in the sample analyz by derivatization and ECDGC according Equation 4.

$$\text{Concentration } (\mu g/L) = \frac{(A)(V_t)(B)(D)}{(V_i)(V_s)(C)(E)}$$

Equation 4

where:

A = Mass of underivatized phenol represented by area of peak in sample chromatogram, determined from calibration curve in Section 7.5.3 (ng).
V_i = Volume of eluate injected (μL).
V_t = Total volume of column eluate or combined fractions from which V_i was taken (μL).
V_s = Volume of water extracted in Section 10.10 (mL).
B = Total volume of hexane added in Section 12.5 (mL).
C = Volume of hexane sample solution added to cleanup column in Section 12.7 (mL).
D = Total volume of 2-propanol extract prior to derivatization (mL).
E = Volume of 2-propanol extract carried through derivatization in Section 12.1 (mL).

13.3 Report results in μg/L without correction for recovery data. All QC data obtained should be reported with the sample results.

14. Method Performance

14.1 The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero.[1] The MDL concentrations listed in Tables 1 and 2 were obtained using reagent water.[13] Similar results were achieved using representative wastewaters. The MDL actually achieved in a given analysis will vary depending on instrument sensitivity and matrix effects.

14.2 This method was tested by 20 laboratories using reagent water, drinking water, surface water, and three industrial wastewaters spiked as six concentrations over the range 12 to 450 μg/L.[13] Single operator precision, overall precision, and method accuracy were found to be directly related to the concentration of the parameter and essentially independent of the sample matrix. Linear equations to describe these relationships for a flame ionization detector are presented in Table 4.

References

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12. "Development of Detection Limits, EPA Method 604, Phenols," Special letter report for EPA Contract 68-03-2625, U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

13. "EPA Method Study 14 Method 604-Phenols," EPA 600/4-84-044, National Technical Information Service, PB84-196211, Springfield, Virginia 22161, May 1984.

TABLE 1.—CHROMATOGRAPHIC CONDITIONS AND METHOD DETECTION LIMITS

Parameter	Retention time (min)	Method detection limit (µg/L)
2-Chlorophenol	1.70	0.31
2-Nitrophenol	2.00	0.45
Phenol	3.01	0.14
2,4-Dimethylphenol	4.03	0.32
2,4-Dichlorophenol	4.30	0.39
2,4,6-Trichlorophenol	6.05	0.64
4-Chloro-3-methylphenol	7.50	0.36
2,4-Dinitrophenol	10.00	13.0
2-Methyl-4,6-dinitrophenol	10.24	16.0
Pentachlorophenol	12.42	7.4
4-Nitrophenol	24.25	2.8

Column conditions: Supelcoport (80/100 mesh) coated with 1% SP-1240DA packed in a 1.8 m long x 2 mm ID glass column with nitrogen carrier gas at 30 mL/min flow rate. Column temperature was 80 °C at injection, programmed immediately at 8 °C/min to 150 °C final temperature. MDL were determined with an FID.

TABLE 2.—SILICA GEL FRACTIONATION AND ELECTRON CAPTURE GAS CHROMATOGRAPHY OF PFBB DERIVATIVES

Parent compound	Percent recovery by fraction [a]				Retention time (min)	Method detection limit (µg/L)
	1	2	3	4		
2-Chlorophenol		90	1		3.3	0.58
2-Nitrophenol			9	90	9.1	0.77
Phenol		90	10		1.8	2.2
2,4-Dimethylphenol		95	7		2.9	0.63
2,4-Dichlorophenol		95	1		5.8	0.68
2,4,6-Trichlorophenol	50	50			7.0	0.58
4-Chloro-3-methylphenol		84	14		4.8	1.8
Pentachlorophenol	75	20			28.8	0.59
4-Nitrophenol			1	90	14.0	0.70

Column conditions: Chromosorb W-AW-DMCS (80/100 mesh) coated with 5% OV-17 packed in a 1.8 m long x 2.0 mm ID glass column with 5% methane/95% argon carrier gas at 30 mL/min flow rate. Column temperature held isothermal at 200 °C. MDL were determined with an ECD.

[a] Eluant composition:
Fraction 1—15% toluene in hexane.
Fraction 2—40% toluene in hexane.
Fraction 3—75% toluene in hexane.
Fraction 4—15% 2-propanol in toluene.

TABLE 3.—QC ACCEPTANCE CRITERIA—METHOD 604

Parameter	Test conc. (µg/L)	Limit for s (µg/L)	Range for $\bar{X}$ (µg/L)	Range P, P
4-Chloro-3-methylphenol	100	16.6	56.7–113.4	49-
2-Chlorophenol	100	27.0	54.1–110.2	38-
2,4-Dichlorophenol	100	25.1	59.7–103.3	44-
2,4-Dimethylphenol	100	33.3	50.4–100.0	24-
4,6-Dinitro-2-methylphenol	100	25.0	42.4–123.6	30-
2,4-Dinitrophenol	100	36.0	31.7–125.1	12-
2-Nitrophenol	100	22.5	56.6–103.8	43-
4-Nitrophenol	100	19.0	22.7–100.0	13-
Pentachlorophenol	100	32.4	56.7–113.5	36-
Phenol	100	14.1	32.4–100.0	23-
2,4,6-Trichlorophenol	100	16.6	60.8–110.4	53-

s—Standard deviation of four recovery measurements, in µg/L (Section 8.2.4).
$\bar{X}$—Average recovery for four recovery measurements, in µg/L (Section 8.2.4).
P, P_s—Percent recovery measured (Section 8.3.2, Section 8.4.2).

NOTE: These criteria are based directly upon the method performance data in Table 4. Where necessary, the limits recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Tab

TABLE 4.—METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION—METHOD 6

Parameter	Accuracy, as recovery, X' (µg/L)	Single Analyst precision, s_r' (µg/L)	Overall precision, (µg/L)
4-Chloro-3-methylphenol	0.87C–1.97	0.11$\bar{X}$–0.21	0.18$\bar{X}$+1
2-Chlorophenol	0.83C–0.84	0.18$\bar{X}$+0.20	0.21$\bar{X}$+0
2,4-Dichlorophenol	0.81C+0.48	0.17$\bar{X}$–0.02	0.18$\bar{X}$+0
2,4-Dimethylphenol	0.62C–1.64	0.30$\bar{X}$–0.89	0.25$\bar{X}$+0
4,6-Dinitro-2-methylphenol	0.84C–1.01	0.15$\bar{X}$+1.25	0.19$\bar{X}$+5
2,4-Dinitrophenol	0.80C–1.58	0.27$\bar{X}$–1.15	0.29$\bar{X}$+4
2-Nitrophenol	0.81C–0.76	0.15$\bar{X}$+0.44	0.14$\bar{X}$+3
4-Nitrophenol	0.46C+0.18	0.17$\bar{X}$+2.43	0.19$\bar{X}$+4
Pentachlorophenol	0.83C+2.07	0.22$\bar{X}$–0.58	0.23$\bar{X}$+0
Phenol	0.43C+0.11	0.20$\bar{X}$–0.88	0.17$\bar{X}$+0
2,4,6-Trichlorophenol	0.86C–0.40	0.10$\bar{X}$+0.53	0.13$\bar{X}$+2

X'=Expected recovery for one or more measurements of a sample containing a concentration of C, in µg/L.
s_r'=Expected single analyst standard deviation of measurements at an average concentration found of $\bar{X}$, in µ
S'=Expected interlaboratory standard deviation of measurements at an average concentration found of $\bar{X}$, in µ
C=True value for the concentration, in µg/L.
$\bar{X}$=Average recovery found for measurements of samples containing a concentration of C, in µg/L.

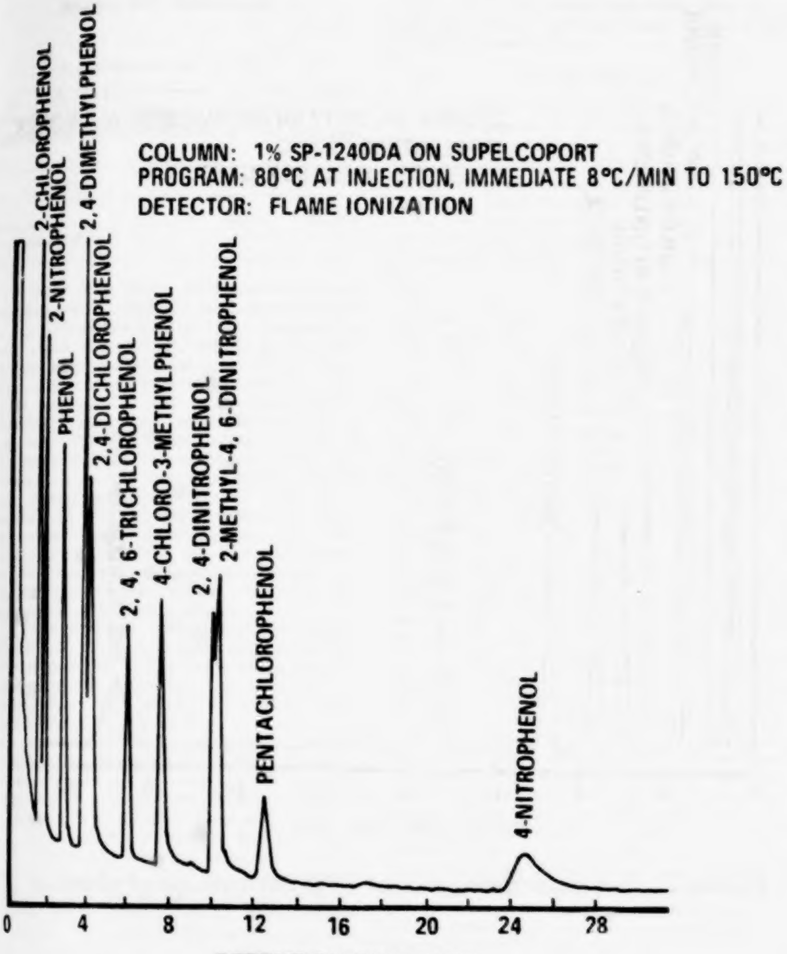

Figure 1. Gas chromatogram of phenols.

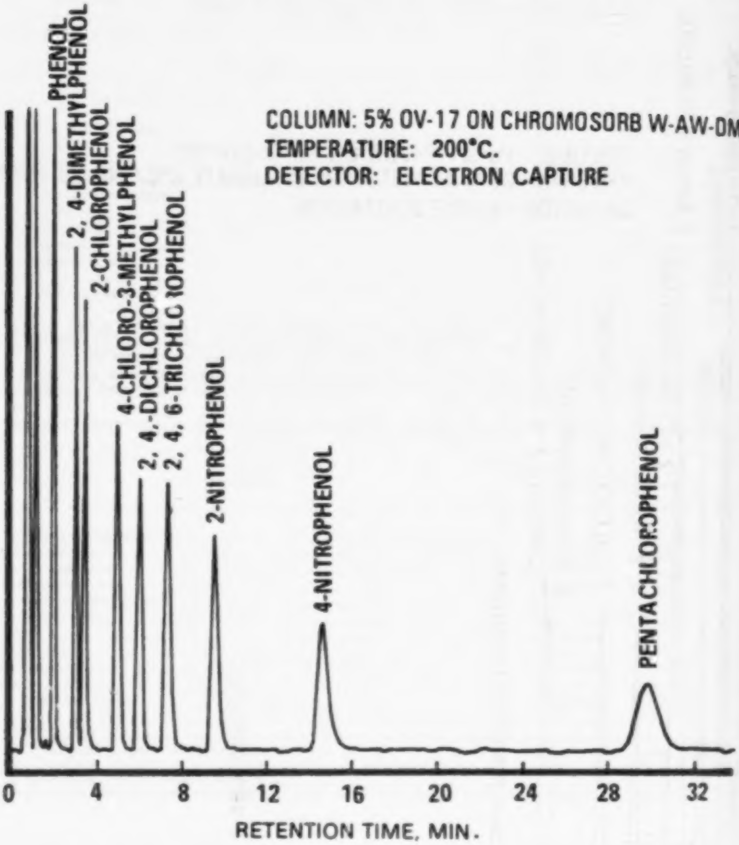

Figure 2. Gas chromatogram of PFB derivatives of phenols.

METHOD 605—BENZIDINES

1. Scope and Application

1.1 This method covers the determination of certain benzidines. The following parameters can be determined by this method:

Parameter	Storet No	CAS No.
Benzidine	39120	92-87-5
3,3'-Dichlorobenzidine	34631	91-94-1

1.2 This is a high performance liquid chromatography (HPLC) method applicable to the determination of the compounds listed above in municipal and industrial discharges as provided under 40 CFR 136.1. When this method is used to analyze unfamiliar samples for the compounds above, identifications should be supported by at least one additional qualitative technique. This method describes electrochemical conditions at a second potential which can be used to confirm measurements made with this method. Method 625 provides gas chromatograph/mass spectrometer (GC/MS) conditions appropriate for the qualitative and quantitative confirmation of results for the parameters listed above, using the extract produced by this method.

1.3 The method detection limit (MDL, defined in Section 14.1)[1] for each parameter is listed in Table 1. The MDL for a specific wastewater may differ from those listed, depending upon the nature of the interferences in the sample matrix.

1.4 Any modification of this method, beyond those expressly permitted, shall be considered as a major modification subject to application and approval of alternate test procedures under 40 CFR 136.4 and 136.5.

1.5 This method is restricted to use by or under the supervision of analysts experienced in the use of HPLC instrumentation and in the interpretation of liquid chromatograms. Each analyst must demonstrate the ability to generate acceptable results with this method using the procedure described in Section 8.2.

2. Summary of Method

2.1 A measured volume of sample, approximately 1-L, is extracted with chloroform using liquid-liquid extractions in a separatory funnel. The chloroform extract is extracted with acid. The acid extract is then neutralized and extracted with chloroform. The final chloroform extract is exchanged to methanol while being concentrated using a rotary evaporator. The extract is mixed with buffer and separated by HPLC. The benzidine compounds are measured with an electrochemical detector.[2]

2.2 The acid back-extraction acts as a general purpose cleanup to aid in the elimination of interferences.

3. Interferences

3.1 Method interferences may be caused by contaminants in solvents, reagents, glassware, and other sample processing hardware that lead to discrete artifacts and/or elevated baselines in chromatograms. All of these materials must be routinely demonstrated to be free from interferences under the conditions of the analysis by running laboratory reagent blanks as described in Section 8.1.3.

3.1.1 Glassware must be scrupulously cleaned.[3] Clean all glassware as soon as possible after use by rinsing with the last solvent used in it. Solvent rinsing should be followed by detergent washing with hot water, and rinses with tap water and distilled water. The glassware should then be drained dry, and heated in a muffle furnace at 400 °C for 15 to 30 min. Some thermally stable materials may not be eliminated by this treatment. Solvent rinses with acetone and pesticide quality hexane may be substituted for the muffle furnace heating. Volumetric ware should not be heated in a muffle furnace. After drying and cooling, glassware should be sealed and stored in a clean environment to prevent any accumulation of dust or other contaminants. Store inverted or capped with aluminum foil.

3.1.2 The use of high purity reagents and solvents helps to minimize interference problems. Purification of solvents by distillation in all-glass systems may be required.

3.2 Matrix interferences may be caused by contaminants that are co-extracted from the sample. The extent of matrix interferences will vary considerably from source to source, depending upon the nature and diversity of the industrial complex or municipality being sampled. The cleanup procedures that are inherent in the extraction step are used to overcome many of these interferences, but unique samples may require additional cleanup approaches to achieve the MDL listed in Table 1.

3.3 Some dye plant effluents contain large amounts of components with retention times closed to benzidine. In these cases, it has been found useful to reduce the electrode potential in order to eliminate interferences and still detect benzidine. (See Section 12.7.)

4. Safety

4.1 The toxicity or carcinogenicity of each reagent used in this method has not been precisely defined; however, each chemical compound should be treated as a potential health harzard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material data handling sheets should also be made available to all personnel involved in the chemical analysis. Additional references to laboratory safety are available and have been identified [4-6] for the information of the analyst.

4.2 The following parameters covered by this method have been tentatively classified as known or suspected, human or mammalian carcinogens: benzidine and 3,3′-dichlorobenzidine. Primary standards of these toxic compounds should be prepared in a hood. A NIOSH/MESA approved toxic gas respirator should be worn when the analyst handles high concentrations of these toxic compounds.

4.3 Exposure to chloroform should be minimized by performing all extractions and extract concentrations in a hood or other well-ventilated area.

5. Apparatus and Materials

5.1 Sampling equipment, for discrete or composite sampling.

5.1.1 Grab sample bottle—1-L or 1-qt, amber glass, fitted with a screw cap lined with Teflon. Foil may be substituted for Teflon if the sample is not corrosive. If amber bottles are not available, protect samples from light. The bottle and cap liner must be washed, rinsed with acetone or methylene chloride, and dried before use to minimize contamination.

5.1.2 Automatic sampler (optional)—The sampler must incorporate glass sample containers for the collection of a minimum of 250 mL of sample. Sample containers must be kept refrigerated at 4°C and protected from light during compositing. If the sampler uses a peristaltic pump, a minimum length of compressible silicone rubber tubing may be used. Before use, however, the compressible tubing should be thoroughly rinsed with methanol, followed by repeated rinsings with distilled water to minimize the potential for contamination of the sample. An integrating flow meter is required to collect flow proportional composites.

5.2 Glassware (All specifications are suggested):

5.2.1 Separatory funnels—2000, 1000, and 250-mL, with Teflon stopcock.

5.2.2 Vials—10 to 15-mL, amber glass, with Teflon-lined screw cap.

5.2.3 Rotary evaporator.

5.2.4 Flasks—Round bottom, 100-mL, with 24/40 joints.

5.2.5 Centrifuge tubes—Conical, graduated, with Teflon-lined screw caps.

5.2.6 Pipettes—Pasteur, with bulbs.

5.3 Balance—Analytical, capable of
rately weighing 0.0001 g.

5.4 High performance liquid chro
graph (HPLC)—An analytical system
plete with column supplies, high pr
syringes, detector, and compatible rec
A data system is recommended for m
ing peak areas and retention times.

5.4.1 Solvent delivery system—
pulse damper, Altex 110A or equivalent

5.4.2 Injection valve (optional)—W
U6K or equivalent.

5.4.3 Electrochemical detector—Bi
lytical Systems LC-2A with glassy c
electrode, or equivalent. This detecto
proven effective in the analysi
wastewaters for the parameters listed i
scope (Section 1.1), and was used to de
the method performance statements in
tion 14. Guidelines for the use of alte
detectors are provided in Section 12.1.

5.4.4 Electrode polishing kit—Prin
Applied Research Model 9320 or equiv

5.4.5 Column—Lichrosorb RP-2, 5 m
particle diameter, in a 25 cm × 4.6 m
stainless steel column. This column
used to develop the method perform
statements in Section 14. Guidelines fo
use of alternate column packings are p
ed in Section 12.1.

6. Reagents

6.1 Reagent water—Reagent water
fined as a water in which an interfere
not observed at the MDL of the param
of interest.

6.2 Sodium hydroxide solution (5
Dissolve 20 g of NaOH (ACS) in re
water and dilute to 100 mL.

6.3 Sodium hydroxide solution (1
Dissolve 40 g of NaOH (ACS) in re
water and dilute to 1 L.

6.4 Sodium thiosulfate—(ACS) Gran

6.5 Sodium tribasic phosphate (0.4
Dissolve 160 g of trisodium phosphate
hydrate (ACS) in reagent water and d
to 1 L.

6.6 Sulfuric acid (1+1)—Slowly, ad
mL of H_2SO_4 (ACS, sp. gr. 1.84) to 50 m
reagent water.

6.7 Sulfuric acid (1 M)—Slowly, ad
mL of H_2SO_4 (ACS, sp. gr. 1.84) to rea
water and dilute to 1 L.

6.8 Acetate buffer (0.1 M, pH 4.7)—
solve 5.8 mL of glacial acetic acid (ACS)
13.6 g of sodium acetate trihydrate (AC
reagent water which has been purifie
filtration through a RO-4 Millipore Sy
or equivalent and dilute to 1 L.

6.9 Acetonitrile, chloroform (prese
with 1% ethanol), methanol—Pesticide q
ity or equivalent.

6.10 Mobile phase—Place equal volu
of filtered acetonitrile (Millipore type
filter or equivalent) and filtered ac
buffer (Millipore type GS filter or equ

lent) in a narrow-mouth, glass container and mix thoroughly. Prepare fresh weekly. Degas daily by sonicating under vacuum, by heating an stirring, or by purging with helium.

6.11 Stock standard solutions (1.00 μg/μL)—Stock standard solutions may be prepared from pure standard materials or purchased as certified solutions.

6.11.1 Prepare stock standard solutions by accurately weighing about 0.0100 g of pure material. Dissolve the material in methanol and dilute to volume in a 10-mL volumetric flask. Larger volumes can be used at the convenience of the analyst. When compound purity is assayed to be 96% or greater, the weight can be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards can be used at any concentration if they are certified by the manufacturer or by an independent source.

6.11.2 Transfer the stock standard solutions into Teflon-sealed screw-cap bottles. Store at 4 °C and protect from light. Stock standard solutions should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

6.11.3 Stock standard solutions must be replaced after six months, or sooner if comparison with check standards indicates a problem.

6.12 Quality control check sample concentrate—See Section 8.2.1.

7. Calibration

7.1 Establish chromatographic operating conditions equivalent to those given in Table 1. The HPLC system can be calibrated using the external standard technique (Section 7.2) or the internal standard technique (Section 7.3).

7.2 External standard calibration procedure:

7.2.1 Prepare calibration standards at a minimum of three concentration levels for each parameter of interest by adding volumes of one or more stock standards to a volumetric flask and diluting to volume with mobile phase. One of the external standards should be at a concentration near, but above, the MDL (Table 1) and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the detector.

7.2.2 Using syringe injections of 5 to 25 μL or a constant volume injection loop, analyze each calibration standard according to Section 12 and tabulate peak height or area responses against the mass injected. The results can be used to prepare a calibration curve for each compound. Alternatively, if the ratio of response to amount injected (calibration factor) is a constant over the working range (<10% relative standard deviation, RSD), linearity through the origin can be assumed and the average ratio or calibration factor can be used in place of a calibration curve.

7.3 Internal standard calibration procedure—To use this approach, the analyst must select one or more internal standards that are similar in analytical behavior to the compounds of interest. The analyst must further demonstrate that the measurement of the internal standard is not affected by method or matrix interferences. Because of these limitations, no internal standard can be suggested that is applicable to all samples.

7.3.1 Prepare calibration standards at a minimum of three concentration levels for each parameter of interest by adding volumes of one or more stock standards to a volumetric flask. To each calibration standard, add a known constant amount of one or more internal standards, and dilute to volume with mobile phase. One of the standards should be at a concentration near, but above, the MDL and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the detector.

7.3.2 Using syringe injections of 5 to 25 μL or a constant volume injection loop, analyze each calibration standard according to Section 12 and tabulate peak height or area responses against concentration for each compound and internal standard. Calculate response factors (RF) for each compound using Equation 1.

$$RF=\frac{(A_s)(C_{is})}{(A_{is})(C_s)}$$

Equation 1

where:

A_s=Response for the parameter to be measured.

A_{is}=Response for the internal standard.

C_{is}=Concentration of the internal standard (μg/L).

C_s=Concentration of the parameter to be measured (μg/L).

If the RF value over the working range is a constant (<10% RSD), the RF can be assumed to be invariant and the average RF can be used for calculations. Alternatively, the results can be used to plot a calibration curve of response ratios, A_s/A_{is}, vs. RF.

7.4 The working calibration curve, calibration factor, or RF must be verified on each working day by the measurement of one or more calibration standards. If the response for any parameter varies from the predicted response by more than ±15%, a new calibration curve must be prepared for that compound. If serious loss of response occurs, polish the electrode and recalibrate.

7.5 Before using any cleanup procedure, the analyst must process a series of calibration standards through the procedure to validate elution patterns and the absence of interferences from the reagents.

8. Quality Control

8.1 Each laboratory that uses this method is required to operate a formal quality control program. The minimum requirements of this program consist of an initial demonstration of laboratory capability and an ongoing analysis of spiked samples to evaluate and document data quality. The laboratory must maintain records to document the quality of data that is generated. Ongoing data quality checks are compared with established performance criteria to determine if the results of analyses meet the performance characteristics of the method. When results of sample spikes indicate atypical method performance, a quality control check standard must be analyzed to confirm that the measurements were performed in an in-control mode of operation.

8.1.1 The analyst must make an initial, one-time, demonstration of the ability to generate acceptable accuracy and precision with this method. This ability is established as described in Section 8.2.

8.1.2 In recognition of advances that are occurring in chromatography, the analyst is permitted certain options (detailed in Sections 10.9, 11.1, and 12.1) to improve the separations or lower the cost of measurements. Each time such a modification is made to the method, the analyst is required to repeat the procedure in Section 8.2.

8.1.3 Before processing any samples, the analyst must analyze a reagent water blank to demonstrate that interferences from the analytical system and glassware are under control. Each time a set of samples is extracted or reagents are changed, a reagent water blank must be processed as a safeguard against laboratory contamination.

8.1.4 The laboratory must, on an ongoing basis, spike and analyze a minimum of 10% of all samples to monitor and evaluate laboratory data quality. This procedure is described in Section 8.3.

8.1.5 The laboratory must, on an ongoing basis, demonstrate through the analyses of quality control check standards that the operation of the measurement system is in control. This procedure is described in Section 8.4. The frequency of the check standard analyses is equivalent to 10% of all samples analyzed but may be reduced if spike recoveries from samples (Section 8.3) meet all specified quality control criteria.

8.1.6 The laboratory must maintain performance records to document the quality of data that is generated. This procedu described in Section 8.5.

8.2 To establish the ability to gene acceptable accuracy and precision, the a lyst must perform the following operati

8.2.1 A quality control (QC) ch sample concentrate is required contai benzidine and/or 3,3′-dichlorobenzidine a concentration of 50 µg/mL each in meth nol. The QC check sample concentrate m be obtained from the U.S. Environme Protection Agency, Environmental Moni ing and Support Laboratory in Cincin Ohio, if available. If not available from t source, the QC check sample concent must be obtained from another exter source. If not available from either sou above, the QC check sample concentr must be prepared by the laboratory u stock standards prepared independe from those used for calibration.

8.2.2 Using a pipet, prepare QC ch samples at a concentration of 50 µg/L adding 1.00 mL of QC check sample con trate to each of four 1-L aliquots of re water.

8.2.3 Analyze the well-mixed QC ch samples according to the method begin in Section 10.

8.2.4 Calculate the average recovery (in µg/L, and the standard deviation of recovery (s) in µg/L, for each param using the four results.

8.2.5 For each parameter compare s a $\bar{X}$ with the corresponding acceptance cr ria for precision and accuracy, respectiv found in Table 2. If s and $\bar{X}$ for all par eters of interest meet the acceptance cr ria, the system performance is accepta and analysis of actual samples can begin. any individual s exceeds the precision li or any individual $\bar{X}$ falls outside the ra for accuracy, the system performance is n acceptable for that parameter. Locate a correct the source of the problem a repeat the test for all parameters of inter beginning with Section 8.2.2.

8.3 The laboratory must, on an ongo basis, spike at least 10% of the samples fr each sample site being monitored to as accuracy. For laboratories analyzing one ten samples per month, at least one spi sample per month is required.

8.3.1 The concentration of the spike the sample should be determined as follo

8.3.1.1 If, as in compliance monitori the concentration of a specific parameter the sample is being checked against a re latory concentration limit, the spike shou be at that limit or 1 to 5 times higher th the background concentration determi in Section 8.3.2, whichever concentrat would be larger.

8.3.1.2 If the concentration of a spec parameter in the sample is not be checked against a limit specific to that

ameter, the spike should be at 50 µg/L or 1
o 5 times higher than the background con-
entration determined in Section 8.3.2,
hichever concentration would be larger.

8.3.1.3 If it is impractical to determine
ackground levels before spiking (e.g., maxi-
um holding times will be exceeded), the
ike concentration should be (1) the regu-
tory concentration limit, if any; or, if none
) the larger of either 5 times higher than
e expected background concentration or
µg/L.

8.3.2 Analyze one sample aliquot to de-
rmine the background concentration (B)
each parameter. If necessary, prepare a
w QC check sample concentrate (Section
.1) appropriate for the background con-
ntrations in the sample. Spike a second
mple aliquot with 1.0 mL of the QC check
mple concentrate and analyze it to deter-
ne the concentration after spiking (A) of
ch parameter. Calculate each percent re-
very (P) as 100(A-B)%/T, where T is the
own true value of the spike.

.3.3 Compare the percent recovery (P)
each parameter with the corresponding
C acceptance criteria found in Table 2.
ese acceptance criteria were calculated to
lude an allowance for error in measure-
nt of both the background and spike con-
ntrations, assuming a spike to background
io of 5:1. This error will be accounted for
the extent that the analyst's spike to
ckground ratio approaches 5:1.[7] If spiking
performed at a concentration lower
n 50 µg/L, the analyst must use either
QC acceptance criteria in Table 2, or op-
nal QC acceptance criteria calculated for
specific spike concentration. To calcu-
e optional acceptance criteria for the re-
ery of a parameter: (1) Calculate accura-
(X') using the equation in Table 3, substi-
ing the spike concentration (T) for C; (2)
culate overall precision (S') using the
ation in Table 3, substituting X' for $\bar{X}$;
calculate the range for recovery at the
ke concentration as $(100\ X'/T) \pm 2.44(100$
$T)\%$.[7]

.3.4 If any individual P falls outside the
ignated range for recovery, that parame-
has failed the acceptance criteria. A
ck standard containing each parameter
t failed the criteria must be analyzed as
cribed in Section 8.4.

4 If any parameter fails the acceptance
eria for recovery in Section 8.3, a QC
ck standard containing each parameter
t failed must be prepared and analyzed.

OTE: The frequency for the required
lysis of a QC check standard will depend
n the number of parameters being si-
ltaneously tested, the complexity of the
ple matrix, and the performance of the
oratory.

4.1 Prepare the QC check standard by
ing 1.0 mL of QC check sample concen-
e (Sections 8.2.1 or 8.3.2) to 1 L of reagent water. The QC check standard needs only to contain the parameters that failed criteria in the test in Section 8.3.

8.4.2 Analyze the QC check standard to determine the concentration measured (A) of each parameter. Calculate each percent recovery (P_s) as 100 (A/T)%, where T is the true value of the standard concentration.

8.4.3 Compare the percent recovery (P_s) for each parameter with the corresponding QC acceptance criteria found in Table 2. Only parameters that failed the test in Section 8.3 need to be compared with these criteria. If the recovery of any such parameter falls outside the designated range, the laboratory performance for that parameter is judged to be out of control, and the problem must be immediately identified and corrected. The analytical result for that parameter in the unspiked sample is suspect and may not be reported for regulatory compliance purposes.

8.5 As part of the QC program for the laboratory, method accuracy for wastewater samples must be assessed and records must be maintained. After the analysis of five spiked wastewater samples as in Section 8.3, calculate the average percent recovery ($\hat{P}$) and the standard deviation of the percent recovery (s_p). Express the accuracy assessment as a percent recovery interval from $\hat{P}-2s_p$ to $\hat{P}+2s_p$. If $\hat{P}=90\%$ and $s_p=10\%$, for example, the accuracy interval is expressed as 70–110%. Update the accuracy assessment for each parameter on a regular basis (e.g. after each five to ten new accuracy measurements).

8.6 It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Field duplicates may be analyzed to assess the precision of the environmental measurements. When doubt exists over the identification of a peak on the chromatogram, confirmatory techniques such as HPLC with a dissimilar column, gas chromatography, or mass spectrometer must be used. Whenever possible, the laboratory should analyze standard reference materials and participate in relevant performance evaluation studies.

9. Sample Collection, Preservation, and Handling

9.1 Grab samples must be collected in glass containers. Conventional sampling practices[8] should be followed, except that the bottle must not be prerinsed with sample before collection. Composite samples should be collected in refrigerated glass containers in accordance with the requirements of the program. Automatic sampling equipment must be as free as possible of Tygon tubing and other potential sources of contamination.

9.2 All samples must be iced or refrigerated at 4°C and stored in the dark from the time of collection until extraction. Both benzidine and 3,3′-dichlorobenzidine are easily oxidized. Fill the sample bottles and, if residual chlorine is present, add 80 mg of sodium thiosulfate per liter of sample and mix well. EPA Methods 330.4 and 330.5 may be used for measurement of residual chlorine.[9] Field test kits are available for this purpose. After mixing, adjust the pH of the sample to a range of 2 to 7 with sulfuric acid.

9.3 If 1,2-diphenylhydrazine is likely to be present, adjust the pH of the sample to 4.0± 0.2 to prevent rearrangement to benzidine.

9.4 All samples must be extracted within 7 days of collection. Extracts may be held up to 7 days before analysis, if stored under an inert (oxidant free) atmosphere.[2] The extract should be protected from light.

10. Sample Extraction

10.1 Mark the water meniscus on the side of the sample bottle for later determination of sample volume. Pour the entire sample into a 2-L separatory funnel. Check the pH of the sample with wide-range pH paper and adjust to within the range of 6.5 to 7.5 with sodium hydroxide solution or sulfuric acid.

10.2 Add 100 mL of chloroform to the sample bottle, seal, and shake 30 s to rinse the inner surface. (Caution: Handle chloroform in a well ventilated area.) Transfer the solvent to the separatory funnel and extract the sample by shaking the funnel for 2 min with periodic venting to release excess pressure. Allow the organic layer to separate from the water phase for a minimum of 10 min. If the emulsion interface between layers is more than one-third the volume of the solvent layer, the analyst must employ mechanical techniques to complete the phase separation. The optimum technique depends upon the sample, but may include stirring, filtration of the emulsion through glass wool, centrifugation, or other physical methods. Collect the chloroform extract in a 250-mL separatory funnel.

10.3 Add a 50-mL volume of chloroform to the sample bottle and repeat the extraction procedure a second time, combining the extracts in the separatory funnel. Perform a third extraction in the same manner.

10.4 Separate and discard any aqueous layer remaining in the 250-mL separatory funnel after combining the organic extracts. Add 25 mL of 1 M sulfuric acid and extract the sample by shaking the funnel for 2 min. Transfer the aqueous layer to a 250-mL beaker. Extract with two additional 25-mL portions of 1 M sulfuric acid and combine the acid extracts in the beaker.

10.5 Place a stirbar in the 250-mL beake
and stir the acid extract while carefully
adding 5 mL of 0.4 M sodium tribasic phos
phate. While monitoring with a pH mete
neutralize the extract to a pH between
and 7 by dropwise addition of 5 N sodium
hydroxide solution while stirring the solu
tion vigorously. Approximately 25 to 30 m
of 5 N sodium hydroxide solution will be re
quired and it should be added over at leas
2-min period. Do not allow the sample pH
exceed 8.

10.6 Transfer the neutralized extra
into a 250-mL separatory funnel. Add 30 m
of chloroform and shake the funnel for
min. Allow the phases to separate, a
transfer the organic layer to a second 2
mL separatory funnel.

10.7 Extract the aqueous layer with t
additional 20-mL aliquots of chloroform
before. Combine the extracts in the 250-m
separatory funnel.

10.8 Add 20 mL of reagent water to th
combined organic layers and shake for 3

10.9 Transfer the organic extract into
100-mL round bottom flask. Add 20 mL
methanol and concentrate to 5 mL with
rotary evaporator at reduced pressure a
35 °C. An aspirator is recommended for
as the source of vacuum. Chill the recei
with ice. This operation requires appro
mately 10 min. Other concentration tec
niques may be used if the requirements
Section 8.2 are met.

10.10 Using a 9-in. Pasteur pipette, tra
fer the extract to a 15-mL, conical, scre
cap centrifuge tube. Rinse the flask, inclu
ing the entire side wall, with 2-mL portio
of methanol and combine with the origi
extract.

10.11 Carefully concentrate the extr
to 0.5 mL using a gentle stream of nitrog
while heating in a 30 °C water bath. Dil
to 2 mL with methanol, reconcentrate to
mL, and dilute to 5 mL with acetate buffe
Mix the extract thoroughly. Cap the cent
fuge tube and store refrigerated and p
tected from light if further processing
not be performed immediately. If the
tract will be stored longer than two days
should be transferred to a Teflon-se
screw-cap vial. If the sample extract
quires no further cleanup, proceed
HPLC analysis (Section 12). If the sam
requires further cleanup, proceed to Sec
11.

10.12 Determine the original sam
volume by refilling the sample bottle to
mark and transferring the liquid to a 1,
mL graduated cylinder. Record the sam
volume to the nearest 5 mL.

11. Cleanup and Separation

11.1 Cleanup procedures may not be
essary for a relatively clean sample ma
If particular circumstances demand the

of a cleanup procedure, the analyst first must demonstrate that the requirements of Section 8.2 can be met using the method as revised to incorporate the cleanup procedure.

12. High Performance Liquid Chromatography

12.1 Table 1 summarizes the recommended operating conditions for the HPLC. Included in this table are retention times, capacity factors, and MDL that can be achieved under these conditions. An example of the separations achieved by this HPLC column is shown in Figure 1. Other HPLC columns, chromatographic conditions, or detectors may be used if the requirements of Section 8.2 are met. When the HPLC is idle, it is advisable to maintain a 0.1 mL/min flow through the column to prolong column life.

12.2 Calibrate the system daily as described in Section 7.

12.3 If the internal standard calibration procedure is being used, the internal standard must be added to the sample extract and mixed thoroughly immediately before injection into the instrument.

12.4 Inject 5 to 25 μL of the sample extract or standard into the HPLC. If constant volume injection loops are not used, record the volume injected to the nearest 0.05 μL, and the resulting peak size in area or peak height units.

12.5 Identify the parameters in the sample by comparing the retention times of the peaks in the sample chromatogram with those of the peaks in standard chromatograms. The width of the retention time window used to make identifications should be based upon measurements of actual retention time variations of standards over the course of a day. Three times the standard deviation of a retention time for a compound can be used to calculate a suggested window size; however, the experience of the analyst should weigh heavily in the interpretation of chromatograms.

12.6 If the response for a peak exceeds the working range of the system, dilute the extract with mobile phase and reanalyze.

12.7 If the measurement of the peak response for benzidine is prevented by the presence of interferences, reduce the electrode potential to +0.6 V and reanalyze. If the benzidine peak is still obscured by interferences, further cleanup is required.

13. Calculations

13.1 Determine the concentration of individual compounds in the sample.

13.1.1 If the external standard calibration procedure is used, calculate the amount of material injected from the peak response using the calibration curve or calibration factor determined in Section 7.2.2. The concentration in the sample can be calculated from Equation 2.

$$\text{Concentration } (\mu g/L) = \frac{(A)(V_t)}{(V_i)(V_s)}$$

Equation 2

where:

A = Amount of material injected (ng).
V_i = Volume of extract injected (μL).
V_t = Volume of total extract (μL).
V_s = Volume of water extracted (mL).

13.1.2 If the internal standard calibration procedure is used, calculate the concentration in the sample using the response factor (RF) determined in Section 7.3.2 and Equation 3.

$$\text{Concentration } (\mu g/L) = \frac{(A_s)(I_s)}{(A_{is})(RF)(V_o)}$$

Equation 3.

where:

A_s = Response for the parameter to be measured.
A_{is} = Response for the internal standard.
I_s = Amount of internal standard added to each extract (μg).
V_o = Volume of water extracted (L).

13.2 Report results in μg/L without correction for recovery data. All QC data obtained should be reported with the sample results.

14. Method Performance

14.1 The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero.[1] The MDL concentrations listed in Table 1 were obtained using reagent water.[10] Similar results were achieved using representative wastewaters. The MDL actually achieved in a given analysis will vary depending on instrument sensitivity and matrix effects.

14.2 This method has been tested for linearity of spike recovery from reagent water and has been demonstrated to be applicable over the concentration range from 7×MDL to 3000×MDL.[10]

14.3 This method was tested by 17 laboratories using reagent water, drinking water, surface water, and three industrial wastewaters spiked at six concentrations over the range 1.0 to 70 μg/L.[11] Single operator precision, overall precision, and method accuracy were found to be directly related to the concentration of the parameter and essentially independent of the sample matrix. Linear equations to describe these relationships are presented in Table 3.

References

1. 40 CFR Part 136, Appendix B.

2. "Determination of Benzidines in Industrial and Muncipal Wastewaters," EPA 600/4-82-022, National Technical Information Service, PB82-196320, Springfield, Virginia 22161, April 1982.

3. ASTM Annual Book of Standards, Part 31, D3694-78. "Standard Practices for Preparation of Sample Containers and for Preservation of Organic Constituents," American Society for Testing and Materials, Philadelphia.

4. "Carcinogens—Working With Carcinogens," Department of Health, Education, and Welfare, Public Health Service, Center for Disease Control, National Institute for Occupational Safety and Health, Publication No. 77-206, August 1977.

5. "OSHA Safety and Health Standards, General Industry," (29 CFR Part 1910), Occupational Safety and Health Administration, OSHA 2206 (Revised, January 1976).

6. "Safety in Academic Chemistry Laboratories," American Chemical Society Publication, Committee on Chemical Safety, 3rd Edition, 1979.

7. Provost, L.P., and Elder, R.S. "Interpretation of Percent Recovery Data," *American Laboratory, 15,* 58-63 (1983). (The value 2.44 used in the equation in Section 8.3.3 is two times the value 1.22 derived in this report.)

8. ASTM Annual Book of Standards, Part 31, D3370-76. "Standard Practices for Sampling Water," American Society for Testing and Materials, Philadelphia.

9. "Methods 330.4 (Titrimetric, DPD-FAS) and 330.5 (Spectrophotometric, DPD) for Chlorine Total Residual," Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268, March 1979.

10. "EPA Method Study 15, Method 605 (Benzidines)," EPA 600/4-84-062, National Technical Information Service, PB84-211176, Springfield, Virginia 22161, June 1984.

11. "EPA Method Validation Study 15, Method 605 (Benzidines)," Report for EPA Contract 68-03-2624 (In preparation).

TABLE 1.—CHROMATOGRAPHIC CONDITIONS AND METHOD DETECTION LIMITS

Parameter	Retention time (min)	Column capacity factor (k')	Method detection limit (μg/L)
Benzidine	6.1	1.44	0.08
3,3'-Dichlorobenzidine	12.1	3.84	0.13

HPLC Column conditions: Lichrosorb RP-2, 5 micron particle size, in a 25 cm×4.6 mm ID stainless steel column. Mobile Phase: 0.8 mL/min of 50% acetonitrile/50% 0.1M pH 4.7 acetate buffer. The MDL were determined using an electrochemical detector operated at +0.8 V.

TABLE 2.—QC ACCEPTANCE CRITERIA—METHOD 605

Parameter	Test conc. (μg/L)	Limit for s (μg/L)	Range for $\bar{X}$ (μg/L)	Range for P, P_s (percent)
Benzidine	50	18.7	9.1–61.0	D–140
3.3'-Dichlorobenzidine	50	23.6	18.7–50.0	5–128

s=Standard deviation of four recovery measurements, in μg/L (Section 8.2.4).
$\bar{X}$=Average recovery for four recovery measurements, in μg/L (Section 8.2.4).
P, P_s=Percent recovery measured (Section 8.3.2, Section 8.4.2).
D=Detected; result must be greater than zero.

Note: These criteria are based directly upon the method performance data in Table 3. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table 3.

TABLE 3.—METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION—METHOD 605

Parameter	Accuracy, as recovery, X' (μg/L)	Single analyst precision, s_r' (μg/L)	Overall precision, S' (μg/L)
Benzidine	$0.70C+0.06$	$0.28\bar{X}+0.19$	$0.40\bar{X}+0.18$
3,3′-Dichlorobenzidine	$0.66C+0.23$	$0.39\bar{X}-0.05$	$0.38\bar{X}+0.02$

X'=Expected recovery for one or more measurements of a sample containing a concentration of C, in μg/L.
s_r'=Expected single analyst standard deviation of measurements at an average concentration found of $\bar{X}$, in μg/L.
S'=Expected interlaboratory standard deviation of measurements at an average concentration found of $\bar{X}$, in μg/L.
C=True value for the concentration, in μg/L.
$\bar{X}$=Average recovery found for measurements of samples containing a concentration of C, in μg/L.

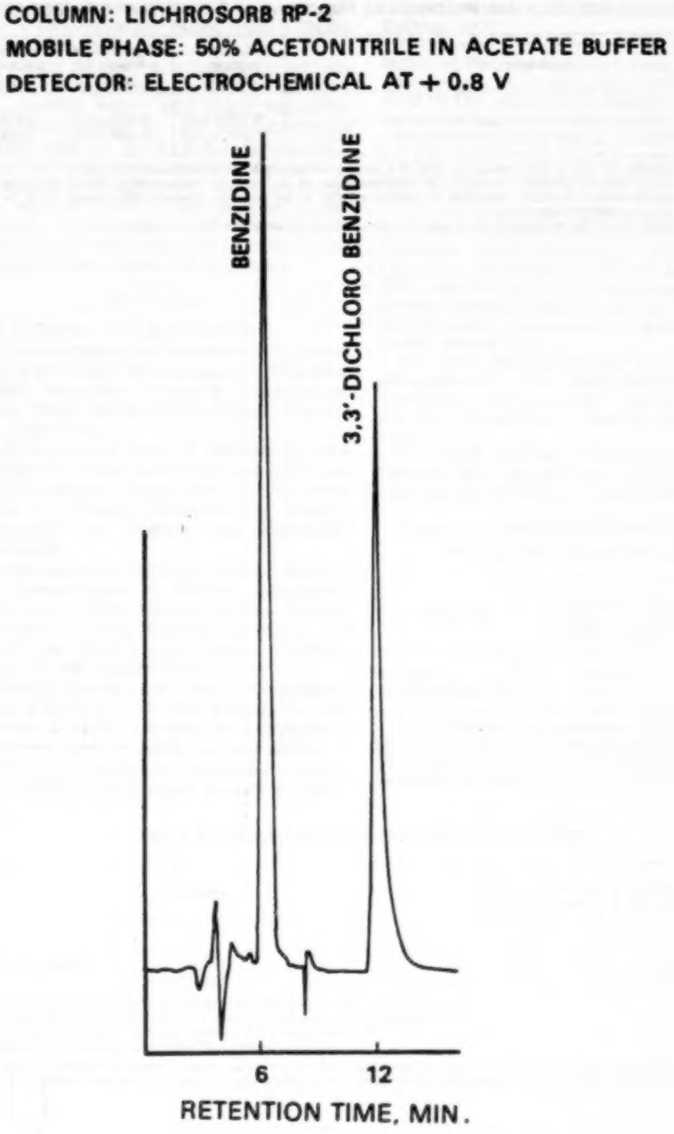

Figure 1. Liquid chromatogram of benzidines.

METHOD 606—PHTHALATE ESTER

1. Scope and Application

1.1 This method covers the determination of certain phthalate esters. The following parameters can be determined by this method:

Parameter	STORET No.	CAS No.
Bis(2-ethylhexyl) phthalate	39100	117-81-7
Butyl benzyl phthalate	34292	85-68-7
Di-n-butyl phthalate	39110	84-74-2
Diethyl phthalate	34336	84-66-2
Dimethyl phthalate	34341	131-11-3
Di-n-octyl phthalate	34596	117-84-0

1.2 This is a gas chromatographic (GC) method applicable to the determination of the compounds listed above in municipal and industrial discharges as provided under 40 CFR 136.1. When this method is used to analyze unfamiliar samples for any or all of the compounds above, compound identifications should be supported by at least one additional qualitative technique. This method describes analytical conditions for a second gas chromatographic column that can be used to confirm measurements made with the primary column. Method 625 provides gas chromatograph/mass spectrometer (GC/MS) conditions appropriate for the qualitative and quantitative confirmation of results for all of the parameters listed above, using the extract produced by this method.

1.3 The method detection limit (MDL, defined in Section 14.1)[1] for each parameter is listed in Table 1. The MDL for a specific wastewater may differ from those listed, depending upon the nature of interferences in the sample matrix.

1.4 The sample extraction and concentration steps in this method are essentially the same as in Methods 608, 609, 611, and 612. Thus, a single sample may be extracted to measure the parameters included in the scope of each of these methods. When cleanup is required, the concentration levels must be high enough to permit selecting aliquots, as necessary, to apply appropriate cleanup procedures. The analyst is allowed the latitude, under Section 12, to select chromatographic conditions appropriate for the simultaneous measurement of combinations of these parameters.

1.5 Any modification of this method, beyond those expressly permitted, shall be considered as a major modification subject to application and approval of alternate test procedures under 40 CFR 136.4 and 136.5.

1.6 This method is restricted to use by or under the supervision of analysts experienced in the use of a gas chromatograph and in the interpretation of gas chromatograms. Each analyst must demonstrate the ability to generate acceptable results with this method using the procedure described in Section 8.2.

2. Summary of Method

2.1 A measured volume of sample, approximately 1-L, is extracted with methylene chloride using a separatory funnel. The methylene chloride extract is dried and exchanged to hexane during concentration to a volume of 10 mL or less. The extract is separated by gas chromatography and the phthalate esters are then measured with an electron capture detector.[2]

2.2 Analysis for phthalates is especially complicated by their ubiquitous occurrence in the environment. The method provides Florisil and alumina column cleanup procedures to aid in the elimination of interferences that may be encountered.

3. Interferences

3.1 Method interferences may be caused by contaminants in solvents, reagents, glassware, and other sample processing hardware that lead to discrete artifacts and/or elevated baselines in gas chromatograms. All of these materials must be routinely demonstrated to be free from interferences under the conditions of the analysis by running laboratory reagent blanks as described in Section 8.1.3.

3.1.1 Glassware must be scrupulously cleaned.[3] Clean all glassware as soon as possible after use by rinsing with the last solvent used in it. Solvent rinsing should be followed by detergent washing with hot water, and rinses with tap water and distilled water. The glassware should then be drained dry, and heated in a muffle furnace at 400 °C for 15 to 30 min. Some thermally stable materials, such as PCBs, may not be eliminated by this treatment. Solvent rinses with acetone and pesticide quality hexane may be substituted for the muffle furnace heating. Thorough rinsing with such solvents usually eliminates PCB interference. Volumetric ware should not be heated in a muffle furnace. After drying and cooling, glassware should be sealed and stored in a clean environment to prevent any accumulation of dust or other contaminants. Store inverted or capped with aluminum foil.

3.1.2 The use of high purity reagents and solvents helps to minimize interference problems. Purification of solvents by distillation in all-glass systems may be required.

3.2 Phthalate esters are contaminants in many products commonly found in the laboratory. It is particularly important to avoid the use of plastics because phthalates are commonly used as plasticizers and are easily extracted from plastic materials. Serious phthalate contamination can result at any time, if consistent quality control is not practiced. Great care must be experienced to prevent such contamination. Exhaustive cleanup of reagents and glassware may be required to eliminate background phthalate contamination.[4,5]

3.3 Matrix interferences may be caused by contaminants that are co-extracted from the sample. The extent of matrix interferences will vary considerably from source to source, depending upon the nature and diversity of the industrial complex or municipality being sampled. The cleanup procedures in Section 11 can be used to overcome many of these interferences, but unique samples may require additional cleanup approaches to achieve the MDL listed in Table 1.

4. Safety

4.1 The toxicity or carcinogenicity of each reagent used in this method has not been precisely defined; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material data handling sheets should also be made available to all personnel involved in the chemical analysis. Additional references to laboratory safety are available and have been identified [6-8] for the information of the analyst.

5. Apparatus and Materials

5.1 Sampling equipment, for discrete or composite sampling.

5.1.1 Grab sample bottle—1-L or 1-qt, amber glass, fitted with a screw cap lined with Teflon. Foil may be substituted for Teflon if the sample is not corrosive. If amber bottles are not available, protect samples from light. The bottle and cap liner must be washed, rinsed with acetone or methylene chloride, and dried before use to minimize contamination.

5.1.2 Automatic sampler (optional)—The sampler must incorporate glass sample containers for the collection of a minimum of 250 mL of sample. Sample containers must be kept refrigerated at 4 °C and protected from light during compositing. If the sampler uses a peristaltic pump, a minimum length of compressible silicone rubber tubing may be used. Before use, however, the compressible tubing should be thoroughly rinsed with methanol, followed by repeated rinsings with distilled water to minimize the potential for contamination of the sample. An integrating flow meter is required to collect flow proportional comp ites.

5.2 Glassware (All specifications are su gested. Catalog numbers are included for lustration only).

5.2.1 Separatory funnel—2-L, wi Teflon stopcock.

5.2.2 Drying column—Chromatograph column, approximately 400 mm long × mm ID, with coarse frit filter disc.

5.2.3 Chromatographic column—300 m long × 10 mm ID, with Teflon stopcock ar coarse frit filter disc at bottom (Kontes K 420540-0213 or equivalent).

5.2.4 Concentrator tube, Kudern Danish—10-mL, graduated (Kontes K 570050-1025 or equivalent). Calibratio must be checked at the volumes employe in the test. Ground glass stopper is used prevent evaporation of extracts.

5.2.5 Evaporative flask, Kudern Danish—500-mL (Kontes K-570001-0500 o equivalent). Attach to concentrator tub with springs.

5.2.6 Snyder column, Kuderna-Danish-Three-ball macro (Kontes K-503000-0121 o equivalent).

5.2.7 Snyder column, Kuderna-Danish-Two-ball micro (Kontes K-569001-0219 o equivalent).

5.2.8 Vials—10 to 15-mL, amber glas with Teflon-lined screw cap.

5.3 Boiling chips—Approximately 10/4 mesh. Heat to 400 °C for 30 min or Soxhle extract with methylene chloride.

5.4 Water bath—Heated, with concentri ring cover, capable of temperature contro (±2 °C). The bath should be used in a hood

5.5 Balance—Analytical, capable of accurately weighing 0.0001 g.

5.6 Gas chromatograph—An analytica system complete with gas chromatograph suitable for on-column injection and all required accessories including syringes, analytical columns, gases, detector, and strip chart recorder. A data system is recommended for measuring peak areas.

5.6.1 Column 1—1.8 m long × 4 mm ID glass, packed with 1.5% SP-2250/1.95% SP-2401 Supelcoport (100/120 mesh) or equivalent. This column was used to develop the method performance statemelts in Sectio 14. Guidelines for the use of alternat column packings are provided in Sectio 12.1.

5.6.2 Column 2—1.8 m long × 4 mm ID glass, packed with 3% OV-1 on Supelcopor (100/120 mesh) or equivalent.

5.6.3 Detector—Electron capture detec tor. This detector has proven effective in the analysis of wastewaters for the param eters listed in the scope (Section 1.1), and was used to develop the method perform ance statements in Section 14. Guideline for the use of alternate detectors are provid ed in Section 12.1.

6. Reagents

6.1 Reagent water—Reagent water is defined as a water in which an interferent is not observed at the MDL of the parameters of interest.

6.2 Acetone, hexane, isooctane, methylene chloride, methanol—Pesticide quality or equivalent.

6.3 Ethyl ether—nanograde, redistilled in glass if necessary.

6.3.1 Ethyl ether must be shown to be free of peroxides before it is used as indicated by EM Laboratories Quant test strips. (Available from Scientific Products Co., Cat. No. P1126-8, and other suppliers.)

6.3.2 Procedures recommended for removal of peroxides are provided with the test strips. After cleanup, 20 mL of ethyl alcohol preservative must be added to each liter of ether.

6.4 Sodium sulfate—(ACS) Granular, anhydrous. Several levels of purification may be required in order to reduce background phthalate levels to an acceptable level: 1) Heat 4 h at 400 °C in a shallow tray, 2) Heat 16 h at 450 to 500 °C in a shallow tray, 3) Soxhlet extract with methylene chloride for 48 h.

6.5 Florisil—PR grade (60/100 mesh). Purchase activated at 1250 °F and store in the dark in glass containers with ground glass stoppers or foil-lined screw caps. To prepare for use, place 100 g of Florisil into a 500-mL beaker and heat for approximately 16 h at 40 °C. After heating transfer to a 500-mL reagent bottle. Tightly seal and cool to room temperature. When cool add 3 mL of reagent water. Mix thoroughly by shaking or rolling for 10 min and let it stand for at least 2 h. Keep the bottle sealed tightly.

6.6 Alumina—Neutral activity Super I, W200 series (ICN Life Sciences Group, No. 404583). To prepare for use, place 100 g of alumina into a 500-mL beaker and heat for approximately 16 h at 400 °C. After heating transfer to a 500-mL reagent bottle. Tightly seal and cool to room temperature. When cool add 3 mL of reagent water. Mix thoroughly by shaking or rolling for 10 min and let it stand for at least 2 h. Keep the bottle sealed tightly.

6.7 Stock standard solutions (1.00 μg/μL)—Stock standard solutions can be prepared from pure standard materials or purchased as certified solutions.

6.7.1 Prepare stock standard solutions by accurately weighing about 0.0100 g of pure material. Dissolve the material in isooctane and dilute to volume in a 10-mL volumetric flask. Larger volumes can be used at the convenience of the analyst. When compound purity is assayed to be 96% or greater, the weight can be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards can be used at any concentration if they are certified by the manufacturer or by an independent source.

6.7.2 Transfer the stock standard solutions into Teflon-sealed screw-cap bottles. Store at 4 °C and protect from light. Stock standard solutions should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

6.7.3 Stock standard solutions must be replaced after six months, or sooner if comparison with check standards indicates a problem.

6.8 Quality control check sample concentrate—See Section 8.2.1.

7. Calibration

7.1 Establish gas chromatograph operating conditions equivalent to those given in Table 1. The gas chromatographic system can be calibrated using the external standard technique (Section 7.2) or the internal standard technique (Section 7.3).

7.2 External standard calibration procedure:

7.2.1 Prepared calibration standards at a minimum of three concentration levels for each parameter of interest by adding volumes of one or more stock standards to a volumetric flask and diluting to volume with isooctane. One of the external standards should be at a concentration near, but above, the MDL (Table 1) and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the detector.

7.2.2 Using injections of 2 to 5 μL, analyze each calibration standard according to Section 12 and tabulate peak height or area responses against the mass injected. The results can be used to prepare a calibration curve for each compound. Alternatively, if the ratio of response to amount injected (calibration factor) is a constant over the working range (< 10% relative standard deviation, RSD), linearity through the origin can be assumed and the average ratio or calibration factor can be used in place of a calibration curve.

7.3 Internal standard calibration procedure—To use this approach, the analyst must select one or more internal standards that are similar in analytical behavior to the compounds of interest. The analyst must further demonstrate that the measurement of the internal standard is not affected by method or matrix interferences. Because of these limitations, no internal standard can be suggested that is applicable to all samples.

7.3.1 Prepare calibration standards at a minimum of three concentration levels for each parameter of interest by adding volumes of one or more stock standards to a volumetric flash. To each calibration standard, add a known constant amount of one or more internal standards, and dilute to volume with isooctane. One of the standards should be at a concentraton near, but above, the MDL and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the detector.

7.3.2 Using injections of 2 to 5 µL, analyze each calibration standard according to Section 12 and tabulate peak height or area responses against concentration for each compound and internal standard. Calculate response factors (RF) for each compound using Equation 1.

$$RF=\frac{(A_s)(C_{is})}{(A_{is})(C_s)}$$

Equation 1

where:

A_s=Response for the parameter to be measured.
A_{is}=Response for the internal standard.
C_{is}=Concentration of the internal standard (µg/L).
C_s=Concentration of the parameter to be measured (µg/L).

If the RF value over the working range is a constant (< 10% RSD), the RF can be assumed to be invariant and the average RF can be used for calculations. Alternatively, the results can be used to plot a calibration curve of response ratios, A_s/A_{is}, vs. RF.

7.4 The working calibration curve, calibration factor, or RF must be verified on each working day by the measurement of one or more calibration standards. If the response for any parameter varies from the predicted response by more than ±15%, a new calibration curve must be prepared for that compound.

7.5 Before using any cleanup procedure, the analyst must process a series of calibration standards through the procedure to validate elution patterns and the absence of interferences from the reagents.

8. Quality Control

8.1 Each laboratory that uses this method is required to operate a formal quality control program. The minimum requirements of this program consist of an initial demonstration of laboratory capability and an ongoing analysis of spiked samples to evaluate and document data quality. The laboratory must maintain records to document the quality of data that is generated. Ongoing data quality checks are compared with established performance criteria to determine if the results of analyses meet the performance characteristics of the method. When results of sample spikes indicate atypical method performance, a quality control check standard must be analyzed to confirm that the measurements were performed in an in-control mode of operation.

8.1.1 The analyst must make an initial, one-time, demonstration of the ability to generate acceptable accuracy and precision with this method. This ability is established as described in Section 8.2.

8.1.2 In recognition of advances that are occurring in chromatography, the analyst is permitted certain options (detailed in Sections 10.4, 11.1, and 12.1) to improve the separations or lower the cost of measurements. Each time such a modification is made to the method, the analyst is required to repeat the procedure in Section 8.2.

8.1.3 Before processing any samples, the analyst must analyze a reagent water blank to demonstrate that interferences from the analytical system and glassware are under control. Each time a set of samples is extracted or reagents are changed, a reagent water blank must be processed as a safeguard against laboratory contamination.

8.1.4 The laboratory must, on an ongoing basis, spike and analyze a minimum of 10% of all samples to monitor and evaluate laboratory data quality. This procedure is described in Section 8.3.

8.1.5 The laboratory must, on an ongoing basis, demonstrate through the analyses of quality control check standards that the operation of the measurement system is in control. This procedure is described in Section 8.4. The frequency of the check standard analyses is equivalent to 10% of all samples analyzed but may be reduced if spike recoveries from samples (Section 8.3) meet all specified quality control criteria.

8.1.6 The laboratory must maintain performance records to document the quality of data that is generated. This procedure is described in Section 8.5.

8.2 To establish the ability to generate acceptable accuracy and precision, the analyst must perform the following operations.

8.2.1 A quality contrml (QC) check sample concentrate is required containing each parameter of interest at the following concentrations in acetone: butyl benzyl phthalate, 10 µg/mL; bis(2-ethylhexyl) phthalate, 50 µg/mL; di-n-octyl phthalate, 50 µg/mL; any other phthlate, 25 µg/mL. The QC check sample concentrate must be obtained from the U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory in Cincinnati, Ohio, if available. If not available from that source, the QC check sample concentrate must be obtained from another external source. If not available from either source above, the QC check sample concentrate must be prepared by the laboratory using stock standards prepared independently from those used for calibration.

8.2.2 Using a pipet, prepare QC check samples at the test concentrations shown in Table 2 by adding 1.00 mL of QC check sample concentrate to each of four 1-L aliquots of reagent water.

8.2.3 Analyze the well-mixed QC check samples according to the method beginning in Section 10.

8.2.4 Calculate the average recovery ($\bar{X}$) in μg/L, and the standard deviation of the recovery (s) in μg/L, for each parameter using the four results.

8.2.5 For each parameter compare s and $\bar{X}$ with the corresponding acceptance criteria for precision and accuracy, respectively, found in Table 2. If s and $\bar{X}$ for all parameters of interest meet the acceptance criteria, the system performance is acceptable and analysis of actual samples can begin. If any individual s exceeds the precision limit or any individual $\bar{X}$ falls outside the range for accuracy, the system performance is unacceptable for that parameter. Locate and correct the source of the problem and repeat the test for all parameters of interest beginning with Section 8.2.2.

8.3 The laboratory must, on an ongoing basis, spike at least 10% of the samples from each sample site being monitored to assess accuracy. For laboratories analyzing one to ten samples per month, at least one spiked sample per month is required.

8.3.1 The concentration of the spike in the sample should be determined as follows:

8.3.1.1 If, as in compliance monitoring, the concentration of a specific parameter in the sample is being checked against a regulatory concentration limit, the spike should be at that limit or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.2 If the concentration of a specific parameter in the sample is not being checked against a limit specific to that parameter, the spike should be at the test concentration in Section 8.2.2 or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.3 If it is impractical to determine background levels before spiking (e.g., maximum holding times will be exceeded), the spike concentration should be (1) the regulatory concentration limit, if any; or, if none (2) the larger of either 5 times higher than the expected background concentration or the test concentration in Section 8.2.2.

8.3.2 Analyze one sample aliquot to determine the background concentration (B) of each parameter. If necessary, prepare a new QC check sample concentrate (Section 8.2.1) appropriate for the background concentrations in the sample. Spike a second sample aliquot with 1.0 mL of the QC check sample concentrate and analyze it to determine the concentration after spiking (A) of each parameter. Calculate each percent recovery (P) as 100(A-B)%/T, where T is the known true value of the spike.

8.3.3 Compare the percent recovery (P) for each parameter with the corresponding QC acceptance criteria found in Table 2. These acceptance criteria were calculated to include an allowance for error in measurement of both the background and spike concentrations, assuming a spike to background ratio of 5:1. This error will be accounted for to the extent that the analyst's spike to background ratio approaches 5:1.[9] If spiking was performed at a concentration lower than the test concentration in Section 8.2.2, the analyst must use either the QC acceptance criteria in Table 2, or optional QC acceptance criteria calculated for the specific spike concentration. To calculate optional acceptance criteria for the recovery of a parameter: (1) Calculate accuracy (X') using the equation in Table 3, substituting the spike concentration (T) for C; (2) calculate overall precision (S') using the equation in Table 3, substituting X' for $\bar{X}$; (3) calculate the range for recovery at the spike concentration as $(100\ X'/T) \pm 2.44(100\ S'/T)\%$.[9]

8.3.4 If any individual P falls outside the designated range for recovery, that parameter has failed the acceptance criteria. A check standard containing each parameter that failed the criteria must be analyzed as described in Section 8.4.

8.4 If any parameter fails the acceptance criteria for recovery in Section 8.3, a QC check standard containing each parameter that failed must be prepared and analyzed.

NOTE: The frequency for the required analysis of a QC check standard will depend upon the number of parameters being simultaneously tested, the complexity of the sample matrix, and the performance of the laboratory.

8.4.1 Prepare the QC check standard by adding 1.0 mL of QC check sample concentrate (Section 8.2.1 or 8.3.2) to 1 L of reagent water. The QC check standard needs only to contain the parameters that failed criteria in the test in Section 8.3.

8.4.2 Analyze the QC check standard to determine the concentration measured (A) of each parameter. Calculate each percent recovery (P_s) as 100 (A/T)%, where T is the true value of the standard concentration.

8.4.3 Compare the percent recovery (P_s) for each parameter with the corresponding QC acceptance criteria found in Table 2. Only parameters that failed the test in Section 8.3 need to be compared with these criteria. If the recovery of any such parameter falls outside the designated range, the laboratory performance for that parameter is judged to be out of control, and the problem must be immediately identified and corrected. The analytical result for that parameter in the unspiked sample is suspect and may not be reported for regulatory compliance purposes.

8.5 As part of the QC program for the laboratory, method accuracy for wastewater samples must be assessed and records must be maintained. After the analysis of five spiked wastewater samples as in Section 8.3, calculate the average percent recovery ($\bar{P}$) and the standard deviation of the percent recovery (s_p). Express the accuracy assessment as a percent recovery interval from $\bar{P}-2s_p$ to $\bar{P}+2s_p$. If $\bar{P}=90\%$ and $s_p=10\%$, for example, the accuracy interval is expressed as 70–110%. Update the accuracy assessment for each parameter on a regular basis (e.g. after each five to ten new accuracy measurements).

8.6 It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Field duplicates may be analyzed to assess the precision of the environmental measurements. When doubt exists over the identification of a peak on the chromatogram, confirmatory techniques such as gas chromatography with a dissimilar column, specific element detector, or mass spectrometer must be used. Whenever possible, the laboratory should analyze standard reference materials and participate in relevant performance evaluation studies.

9. Sample Collection, Preservation, and Handling

9.1 Grab samples must be collected in glass containers. Conventional sampling practices[10] should be followed, except that the bottle must not be prerinsed with sample before collection. Composite samples should be collected in refrigerated glass containers in accordance with the requirements of the program. Automatic sampling equipment must be as free as possible of Tygon tubing and other potential sources of contamination.

9.2 All samples must be iced or refrigerated at 4 °C from the time of collection until extraction.

9.3 All samples must be extracted within 7 days of collection and completely analyzed within 40 days of extraction.[2]

10. Sample Extraction

10.1 Mark the water meniscus on the side of the sample bottle for later determination of sample volume. Pour the entire sample into a 2-L separatory funnel.

10.2 Add 60 mL of methylene chloride to the sample bottle, seal, and shake 30 s to rinse the inner surface. Transfer the solvent to the separatory funnel and extract the sample by shaking the funnel for 2 min. with periodic venting to release excess pressure. Allow the organic layer to separate from the water phase for a minimum of 10 min. If the emulsion interface between layers is more than one-third the volume of the solvent layer, the analyst must employ mechanical techniques to complete the phrase separation. The optimum technique depends upon the sample, but may include stirring, filtration of the emulsion through glass wool, centrifugation, or other physical methods. Collect the methylene chloride extract in a 250-mL Erlenmeyer flask.

10.3 Add a second 60-mL volume of methylene chloride to the sample bottle and repeat the extraction procedure a second time, combining the extracts in the Erlenmeyer flask. Perform a third extraction in the same manner.

10.4 Assemble a Kuderna-Danish (K-D) concentrator by attaching a 10-mL concentrator tube to a 500-mL evaporative flask. Other concentrator devices or techniques may be used in place of the K-D concentrator if the requirements of Section 8.2 are met.

10.5 Pour the combined extract through a solvent-rinsed drying column containing about 10 cm of anhydrous sodium sulfate, and collect the extract in the K-D concentrator. Rinse the Erlenmeyer flask and column with 20 to 30 mL of methylene chloride to complete the quantitative transfer.

10.6 Add one or two clean boiling chips to the evaporative flask and attach a three-ball Snyder column. Prewet the Snyder column by adding about 1 mL of methylene chloride to the top. Place the K-D apparatus on a hot water bath (60 to 65 °C) so that the concentrator tube is partially immersed in the hot water, and the entire lower rounded surface of the flask is bathed with hot vapor. Adjust the vertical position of the apparatus and the water temperature as required to complete the concentration in 15 to 20 min. At the proper rate of distillation the balls of the column will actively chatter but the chambers will not flood with condensed solvent. When the apparent volume of liquid reaches 1 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 min.

10.7 Increase the temperature of the hot water bath to about 80 °C. Momentarily remove the Snyder column, add 50 mL of hexane and a new boiling chip, and reattach the Snyder column. Concentrate the extract as in Section 10.6, except use hexane to prewet the column. The elapsed time of concentration should be 5 to 10 min.

10.8 Remove the Snyder column and rinse the flask and its lower joint into the concentrator tube with 1 to 2 mL of hexane. A 5-mL syringe is recommended for this operation. Adjust the extract volume to 10 mL. Stopper the concentrator tube and store refrigerated if further processing will not be performed immediately. If the extract will be stored longer than two days, it should be transferred to a Teflon-sealed screw-cap vial. If the sample extract requires no further cleanup, proceed with gas chromatographic analysis (Section 12). If the sample requires further cleanup, proceed to Section 11.

10.9 Determine the original sample volume by refilling the sample bottle to the mark and transferring the liquid to a 1000-mL graduated cylinder. Record the sample volume to the nearest 5 mL.

11. Cleanup and Separation

11. Cleanup procedures may not be necessary for a relatively clean sample matrix. If particular circumstances demand the use of a cleanup procedure, the analyst may use either procedure below or any other appropriate procedure. However, the analyst first must demonstrate that the requirements of Section 8.2 can be met using the method as revised to incorporate the cleanup procedure.

11.2 If the entire extract is to be cleaned up by one of the following procedures, it must be concentrated to 2.0 mL. To the concentrator tube in Section 10.8, add a clean boiling chip and attach a two-ball micro-Snyder column. Prewet the column by adding about 0.5 mL of hexane to the top. Place the micro-K-D apparatus on a hot water bath (80 °C) so that the concentrator tube is partially immersed in the hot water. Adjust the vertical position of the apparatus and the water temperature as required to complete the concentration in 5 to 10 min. At the proper rate of distillation the balls of the column will actively chatter but the chambers will not flood. When the apparent volume of liquid reaches about 0.5 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 min. Remove the micro-Snyder column and rinse its lower joint into the concentrator tube with 0.2 mL of hexane. Adjust the final volume to 2.0 mL and proceed with one of the following cleanup procedures.

11.3 Florisil column cleanup for phthalate esters:

11.3.1 Place 10 g of Florisil into a chromatographic column. Tap the column to settle the Florisil and add 1 cm of anhydrous sodium sulfate to the top.

11.3.2 Preelute the column with 40 mL of hexane. The rate for all elutions should be about 2 mL/min. Discard the eluate and just prior to exposure of the sodium sulfate layer to the air, quantitatively transfer the 2-mL sample extract onto the column using an additional 2 mL of hexane to complete the transfer. Just prior to exposure of the sodium sulfate layer to the air, add 40 mL of hexane and continue the elution of the column. Discard this hexane eluate.

11.3.3 Next, elute the column with 100 mL of 20% ethyl ether in hexane (V/V) into a 500-mL K-D flask equipped with a 10-mL concentrator tube. Concentrate the collected fraction as in Section 10.6. No solvent exchange is necessary. Adjust the volume of the cleaned up extract to 10 mL in the concentrator tube and analyze by gas chromatography (Section 12).

11.4 Alumina column cleanup for phthalate esters:

11.4.1 Place 10 g of alumina into a chromatographic column. Tap the column to settle the alumina and add 1 cm of anhydrous sodium sulfate to the top.

11.4.2 Preelute the column with 40 mL of hexane. The rate for all elutions should be about 2 mL/min. Discard the eluate and just prior to exposure of the sodium sulfate layer to the air, quantitatively transfer the 2-mL sample extract onto the column using an additional 2 mL of hexane to complete the transfer. Just prior to exposure of the sodium sulfate layer to the air, add 35 mL of hexane and continue the elution of the column. Discard this hexane eluate.

11.4.3 Next, elute the column with 140 mL of 20% ethyl ether in hexane (V/V) into a 500-mL K-D flask equipped with a 10-mL concentrator type. Concentrate the collected fraction as in Section 10.6. No solvent exchange is necessary. Adjust the volume of the cleaned up extract to 10 mL in the concentrator tube and analyze by gas chromatography (Section 12).

12. Gas Chromatography

12.1 Table 1 summarizes the recommended operating conditions for the gas chromatograph. Included in this table are retention times and MDL that can be achieved under these conditions. Examples of the separations achieved by Column 1 are shown in Figures 1 and 2. Other packed or capillary (open-tubular) columns, chromatographic conditions, or detectors may be used if the requirements of Section 8.2 are met.

12.2 Calibrate the system daily as described in Section 7.

12.3 If the internal standard calibration procedure is being used, the internal staldard must be added to the sample extract and mixed thoroughly immediately before injection into the gas chromatograph.

12.4 Inject 2 to 5 μL of the sample extract or standard into the gas-chromatograph using the solvent-flush technique.[11] Smaller (1.0 μL) volumes may be injected if automatic devices are employed. Record the volume injected to the nearest 0.05 μL, and the resulting peak size in area or peak height units.

12.5 Identify the parameters in the sample by comparing the retention times of the peaks in the sample chromatogram with those of the peaks in standard chromatograms. The width of the retention time window used to make identifications should be based upon measurements of actual retention time variations of standards over the course of a day. Three times the standard deviation of a retention time for a compound can be used to calculate a suggested window size; however, the experience of the analyst should weigh heavily in the interpretation of chromatograms.

12.6 If the response for a peak exceeds the working range of the system, dilute the extract and reanalyze.

12.7 If the measurement of the peak response is prevented by the presence of interferences, further cleanup is required.

13. Calculations

13.1 Determine the concentration of individual compounds in the sample.

13.1.1 If the external standard calibration procedure is used, calculate the amount of material injected from the peak response using the calibration curve or calibration factor determined in Section 7.2.2. The concentration in the sample can be calculated from Equation 2.

$$\text{Concentration } (\mu g/L) = \frac{(A)(V_t)}{(V_i)(V_s)}$$

Equation 2.

where:

A = Amount of material injected (ng).
V_i = Volume of extract injected (μL).
V_t = Volume of total extract (μL).
V_s = Volume of water extracted (mL).

13.1.2 If the internal standard calibration procedure is used, calculate the concentration in the sample using the response factor (RF) determined in Section 7.3.2 and Equation 3.

$$\text{Concentration } (\mu g/L) = \frac{(A_s)(I_s)}{(A_{is})(RF)(V_o)}$$

Equation 3.

where:

A_s = Response for the parameter to be measured.
A_{is} = Response for the internal standard.
I_s = Amount of internal standard added to each extract (μg).
V_o = Volume of water extracted (L).

13.2 Report results in μg/L without correction for recovery data. All QC data obtained should be reported with the sample results.

14. Method Performance

14.1 The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero.[1] The MDL concentrations listed in Table 1 were obtained using reagent water.[12] Similar results were achieved using representative wastewaters. The MDL actually achieved in a given analysis will vary depending on instrument sensitivity and matrix effects.

14.2 This method has been tested for linearity of spike recovery from reagent water and has been demonstrated to be applicable over the concentration range from 5 × MDL to 1000 × MDL with the following exceptions: dimethyl and diethyl phthalate recoveries at 1000 × MDL were low (70%); bis-2-ethylhexyl and di-n-octyl phthalate recoveries at 5 × MDL were low (60%).[12]

14.3 This method was tested by 16 laboratories using reagent water, drinking water, surface water, and three industrial wastewaters spiked at six concentrations over the range 0.7 to 106 μg/L.[13] Single operator precision, overall precision, and method accuracy were found to be directly related to the concentration of the parameter and essentially independent of the sample matrix. Linear equations to describe these relationships are presented in Table 1

References

1. 40 CFR Part 136, Appendix B.

2. "Determination of Phthalates in Industrial and Muncipal Wastewaters," EPA 60 4-81-063, National Technical Information Service, PB81-232167, Springfield, Virginia 22161, July 1981.

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8. "Safety in Academic Chemistry Laboratories," American Chemical Society Publication, Committee on Chemical Safety, 3rd Edition, 1979.

9. Provost L.P., and Elder, R.S. "Interpretation of Percent Recovery Data," *American Laboratory, 15*, 58–63 (1983). (The value 2.44 used in the equation in Section 8.3.3 is two times the value 1.22 derived in this report.)

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12. "Method Detection Limit and Analytical Curve Studies, EPA Methods 606, 607, and 608," Special letter report for EPA Contract 68-03-2606, U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268, June 1980.

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TABLE 1.—CHROMATOGRAPHIC CONDITIONS AND METHOD DETECTION LIMITS

Parameter	Retention time (min)		Method detection limit (μg/L)
	Column 1	Column 2	
Dimethyl phthalate	2.03	0.95	0.29
Diethyl phthalate	2.82	1.27	0.49
Di-n-butyl phthalate	8.65	3.50	0.36
Butyl benzyl phthalate	ᵃ6.94	ᵃ5.11	0.34
Bis(2-ethylhexyl) phthalate	ᵃ8.92	ᵃ10.5	2.0
Di-n-octyl phthalate	ᵃ16.2	ᵃ18.0	3.0

Column 1 conditions: Supelcoport (100/120 mesh) coated with 1.5% SP-2250/1.95% SP-2401 packed in a 1.8 m long × 4 mm ID glass column with 5% methane/95% argon carrier gas at 60 mL/min flow rate. Column temperature held isothermal at 180°C, except where otherwise indicated.

Column 2 conditions: Supelcoport (100/120 mesh) coated with 3% OV-1 packed in a 1.8 m long × 4 mm ID glass column with 5% methane/95% argon carrier gas at 60 mL/min flow rate. Column temperature held isothermal at 200 °C, except where otherwise indicated.

[a] 220 °C column temperature.

TABLE 2.—QC ACCEPTANCE CRITERIA—METHOD 606

Parameter	Test conc. (μg/L)	Limit for s (μg/L)	Range for $\bar{X}$ (μg/L)	Range for P, P_s (percent)
Bis(2-ethylhexyl) phthalate	50	38.4	1.2–55.9	D–158
Butyl benzyl phthalate	10	4.2	5.7–11.0	30–136
Di-n-butyl phthalate	25	8.9	10.3–29.6	23–136
Diethyl phthalate	25	9.0	1.9–33.4	D–149
Dimethyl phathalate	25	9.5	1.3–35.5	D–156
Di-n-octyl phthalate	50	13.4	D–50.0	D–114

s=Standard deviation of four recovery measurements, in μg/L (Section 8.2.4).
$\bar{X}$=Average recovery for four recovery measurements, in μg/L (Section 8.2.4).
P, P_s=Percent recovery measured (Section 8.3.2, Section 8.4.2).
D=Detected; result must be greater than zero.

Note: These criteria are based directly upon the method performance data in Table 3. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table 3.

TABLE 3.—METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION—METHOD 606

Parameter	Accuracy, as recovery, X′ (μg/L)	Single analyst precision, s_r' (μg/L)	Overall precision, S′ (μg/L)
Bis(2-ethylhexyl) phthalate	0.53C+2.02	$0.80\bar{X}-2.54$	$0.73\bar{X}-0.17$
Butyl benzyl phthalate	0.82C+0.13	$0.26\bar{X}+0.04$	$0.25\bar{X}+0.07$

TABLE 3.—METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION—METHOD 606—Continued

Parameter	Accuracy, as recovery, X' (μg/L)	Single analyst precision, s_r' (μg/L)	Overall precision, S' (μg/L)
Di-n-butyl phthalate	$0.79C+0.17$	$0.23\bar{X}+0.20$	$0.29\bar{X}+0.06$
Diethyl phthalate	$0.70C+0.13$	$0.27\bar{X}+0.05$	$0.45\bar{X}+0.11$
Dimethyl phthalate	$0.73C+0.17$	$0.26\bar{X}+0.14$	$0.44\bar{X}+0.31$
Di-n-octyl phthalate	$0.35C-0.71$	$0.38\bar{X}+0.71$	$0.62\bar{X}+0.34$

X'=Expected recovery for one or more measurements of a sample containing a concentration of C, in μg/L.
s_r'=Expected single analyst standard deviation of measurements at an average concentration found of $\bar{X}$, in μg/L.
S'=Expected interlaboratory standard deviation of measurements at an average concentration found of $\bar{X}$, in μg/L.
C=True value for the concentration, in μg/L.
$\bar{X}$=Average recovery found for measurements of samples containing a concentration of C, in μg/L.

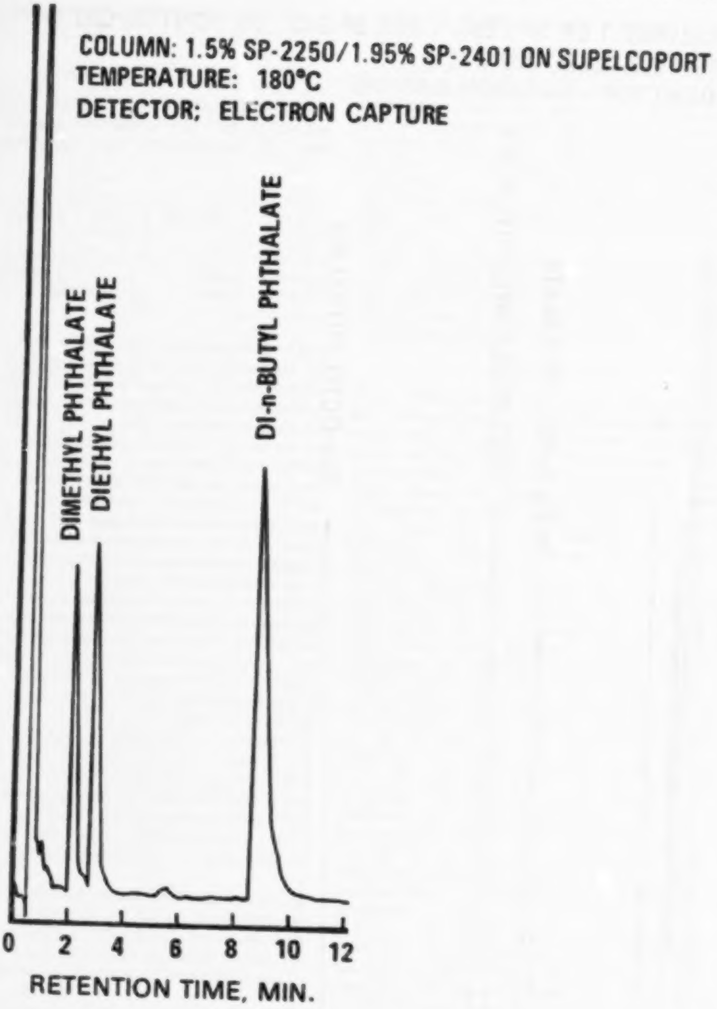
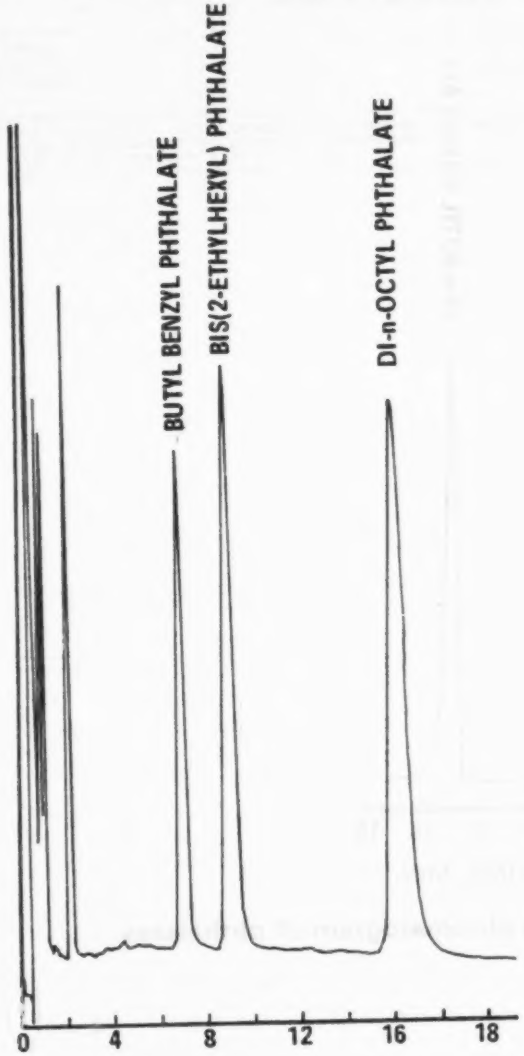


Figure 1. Gas chromatogram of phthalates.



COLUMN: 1.5% SP-2250/1.95% SP-2401 ON SUPELCOPORT
TEMPERATURE: 220°C
DETECTOR: ELECTRON CAPTURE

Figure 2. Gas chromatogram of phthalates.

METHOD 607—NITROSAMINES

1. Scope and Application

1.1 This method covers the determination of certain nitrosamines. The following parameters can be determined by this method:

Parameter	Storet No.	CAS No.
N-Nitrosodimethylamine	34438	62-75-9
N-Nitrosodiphenylamine	34433	86-30-6
N-Nitrosodi-n-propylamine	34428	621-64-7

1.2 This is a gas chromatographic (GC) method applicable to the determination of the parameters listed above in municipal and industrial discharges as provided under 40 CFR 136.1. When this method is used to analyze unfamiliar samples for any or all of the compmunds above, compound identifications should be supported by at least one additional qualitative technique. This method describes analytical conditimns for a second gas chromatographic column that can be used to confirm measurements made with the primary column. Method 625 provides gas chromatograph/mass spectrometer (GC/MS) conditions appropriate for the qualitative and quantitative confirmation of results for N-nitrosodi-n-propylamine. In order to confirm the presence of N-nitrosodiphenylamine, the cleanup procedure specified in Section 11.3 or 11.4 must be used. In order to confirm the presence of N-nitrosodimethylamine by GC/MS, Column 1 of this method must be substituted for the column recommended in Method 625. Confirmation of these parameters using GC-high resolution mass spectrometry or a Thermal Energy Analyzer is also recommended.[1 2]

1.3 The method detection limit (MDL, defined in Section 14.1)[3] for each parameter is listed in Table 1. The MDL for a specific wastewater may differ from those listed, depending upon the nature of interferences in the sample matrix.

1.4 Any modification of this method, beyond those expressly permitted, shall be considered as a major modification subject to application and approval of alternate test procedures under 40 CFR 136.4 and 136.5.

1.5 This method is restricted to use by or under the supervision of analysts experienced in the use of a gas chromatograph and in the interpretation of gas chromatograms. Each analyst must demonstrate the ability to generate acceptable results with this method using the procedure described in Section 8.2.

2. Summary of Method

2.1 A measured volume of sample, approximately 1-L, is extracted with methylene chloride using a separatory funnel. The methylene chloride extract is washed with dilute hydrochloric acid to remove free amines, dried, and concentrated to a volume of 10 mL or less. After the extract has been exchanged to methanol, it is separated by gas chromatography and the parameters are then measured with a nitrogen-phosphorus detector.[4]

2.2 The method provides Florisil and alumina column cleanup procedures to separate diphenylamine from the nitrosamines and to aid in the elimination of interferences that may be encountered.

3. Interferences

3.1 Method interferences may be caused by contaminants in solvents, reagents, glassware, and other sample processing hardware that lead to discrete artifacts and/or elevated baselines in gas chromatograms. All of these materials must be routinely demonstrated to be free from interferences under the conditions of the analysis by running laboratory reagent blanks as described in Section 8.1.3.

3.1.1 Glassware must be scrupulously cleaned.[5] Clean all glassware as soon as possible after use by rinsing with the last solvent used in it. Solvent rinsing should be followed by detergent washing with hot water, and rinses with tap water and distilled water. The glassware should then be drained dry, and heated in a muffle furnace at 400 °C for 15 to 30 min. Solvent rinses with acetone and pesticide quality hexane may be substituted for the muffle furnace heating. Volumetric ware should not be heated in a muffle furnace. After drying and cooling, glassware should be sealed and stored in a clean environment to prevent any accumulation of dust or other contaminants. Store inverted or capped with aluminum foil.

3.1.2 The use of high purity reagents and solvents helps to minimize interference problems. Purification of solvents by distillation in all-glass systems may be required.

3.2 Matrix interferences may be caused by contaminants that are co-extracted from the sample. The extent of matrix interferences will vary considerably from source to source, depending upon the nature and diversity of the industrial complex or municipality being sampled. The cleanup procedures in Section 11 can be used to overcome many of these interferences, but unique samples may require additional cleanup approaches to achieve the MDL listed in Table 1.

3.3 N-Nitrosodiphenylamine is reported[6 7] to undergo transnitrosation reactions. Care must be exercised in the heating or concentrating of solutions containing this compound in the presence of reactive amines.

3.4 The sensitive and selective Thermal Energy Analyzer and the reductive Hall detector may be used in place of the nitrogen-phosphorus detector when interferences are encountered. The Thermal Energy Analyzer offers the highest selectivity of the non-MS detectors.

4. Safety

4.1 The toxicity or carcinogenicity of each reagent used in this method has not been precisely defined; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material data handling sheets should also be made available to all personnel involved in the chemical analysis. Additional references to laboratory safety are available and have been identified [10-12] for the information of the analyst.

4.2 These nitrosamines are known carcinogens [13-17], therefore, utmost care must be exercised in the handling of these materials. Nitrosamine reference standards and standard solutions should be handled and prepared in a ventilated glove box within a properly ventilated room.

5. Apparatus and Materials

5.1 Sampling equipment, for discrete or composite sampling.

5.1.1 Grab sample bottle—1-L or 1-qt, amber glass, fitted with a screw cap lined with Teflon. Foil may be substituted for Teflon if the sample is not corrosive. If amber bottles are not available, protect samples from light. The bottle and cap liner must be washed, rinsed with acetone or methylene chloride, and dried before use to minimize contamination.

5.1.2 Automatic sampler (optional)—The sampler must incorporate glass sample containers for the collection of a minimum of 250 mL of sample. Sample containers must be kept refrigerated at 4 °C and protected from light during compositing. If the sampler uses a peristaltic pump, a minimum length of compressible silicone rubber tubing may be used. Before use, however, the compressible tubing should be thoroughly rinsed with methanol, followed by repeated rinsings with distilled water to minimize the potential for contamination of the sample. An integrating flowmeter is required to collect flow proportional composites.

5.2 Glassware (All specifications are suggested. Catalog numbers are included for illustration only.):

5.2.1 Separatory funnels—2-L and 250-mL, with Teflon stopcock.

5.2.2 Drying column—Chromatographic column, approximately 400 mm long × 19 mm ID, with coarse frit filter disc.

5.2.3 Concentrator tube, Kuderna-Danish—10-mL, graduated (Kontes K-570050-1025 or equivalent). Calibration must be checked at the volumes employed in the test. Ground glass stopper is used to prevent evaporation of extracts.

5.2.4 Evaporative flask, Kuderna-Danish—500-mL (Kontes K-570001-0500 or equivalent). Attach to concentrator tube with springs.

5.2.5 Snyder column, Kuderna-Danish—Three-ball macro (Kontes K-503000-0121 or equivalent).

5.2.6 Snyder column, Kuderna-Danish—Two-ball micro (Kontes K-569001-0219 or equivalent).

5.2.7 Vials—10 to 15-mL, amber glass, with Teflon-lined screw cap.

5.2.8 Chromatographic column—Approximately 400 mm long × 22 mm ID, with Teflon stopcock and coarse frit filter disc at bottom (Kontes K-420540-0234 or equivalent), for use in Florisil column cleanup procedure.

5.2.9 Chromatographic column—Approximately 300 mm long × 10 mm ID, with Teflon stopcock and coarse frit filter disc at bottom (Kontes K-420540-0213 or equivalent), for use in alumina column cleanup procedure.

5.3 Boiling chips—Approximately 10/40 mesh. Heat to 400 °C for 30 min or Soxhlet extract with methylene chloride.

5.4 Water bath—Heated, with concentric ring cover, capable of temperature control (±2 °C). The bath should be used in a hood.

5.5 Balance—Analytical, capable of accurately weighing 0.0001 g.

5.6 Gas chromatograph—An analytical system complete with gas chromatograph suitable for on-column injection and all required accessories including syringes, analytical columns, gases, detector, and strip-chart recorder. A data system is recommended for measuring peak areas.

5.6.1 Column 1—1.8 m long × 4 mm ID glass, packed with 10% Carbowax 20 M/2% KOH on Chromosorb W-AW (80/100 mesh) or equivalent. This column was used to develop the method performance statements in Section 14. Guidelines for the use of alternate column packings are provided in Section 12.2.

5.6.2 Column 2—1.8 m long x 4 mm ID glass, packed with 10% SP-2250 on Supelcoport (100/120 mesh) or equivalent.

5.6.3 Detector—Nitrogen-phosphorus, reductive Hall, or Thermal Energy Analyzer detector.[1,2] These detectors have proven effective in the analysis of wastewaters for the parameters listed in the scope (Section 1.1). A nitrogen-phosphorus detector was used to develop the method performance statements in Section 14. Guidelines for the use of alternate detectors are provided in Section 12.2.

6. Reagents

6.1 Reagent water—Reagent water is defined as a water in which an interferent is not observed at the MDL of the parameters of interest.

6.2 Sodium hydroxide solution (10 N)—Dissolve 40 g of NaOH (ACS) in reagent water and dilute to 100 ml.

6.3 Sodium thiosulfate—(ACS) Granular.

6.4 Sulfuric acid (1+1)—Slowly, add 50 mL of H_2SO_4 (ACS, sp. gr. 1.84) to 50 mL of reagent water.

6.5 Sodium sulfate—(ACS) Granular, anhydrous. Purify by heating at 400 °C for 4 h in a shallow tray.

6.6 Hydrochloric acid (1+9)—Add one volume of concentrated HCl (ACS) to nine volumes of reagent water.

6.7 Acetone, methanol, methylene chloride, pentane—Pesticide quality or equivalent.

6.8 Ethyl ether—Nanograde, redistilled in glass if necessary.

6.8.1 Ethyl ether must be shown to be free of peroxides before it is used as indicated by EM Laboratories Quant test strips. (Available from Scientific Products Co., Cat No. P1126-8, and other suppliers.)

6.8.2 Procedures recommended for removal of peroxides are provided with the test strips. After cleanup, 20 mL of ethyl alcohol preservative must be added to each liter of ether.

6.9 Florisil—PR grade (60/100 mesh). Purchase activated at 1250 °F and store in the dark in glass containers with ground glass stoppers or foil-lined screw caps. Before use, activate each batch at least 16 h at 130 °C in a foil-covered glass container and allow to cool.

6.10 Alumina—Basic activity Super I, W200 series (ICN Life Sciences Group, No. 04571, or equivalent). To prepare for use, place 100 g of alumina into a 500-mL reagent bottle and add 2 mL of reagent water. Mix the alumina preparation thoroughly by shaking or rolling for 10 min and let it stand for at least 2 h. The preparation should be homogeneous before use. Keep the bottle sealed tightly to ensure proper activity.

6.11 Stock standard solutions (1.00 μg/ μL)—Stock standard solutions can be prepared from pure standard materials or purchased as certified solutions.

6.11.1 Prepare stock standard solutions by accurately weighing about 0.0100 g of pure material. Dissolve the material in methanol and dilute to volume in a 10-mL volumetric flask. Larger volumes can be used at the convenience of the analyst. When compound purity is assayed to be 96% or greater, the weight can be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards can be used at any concentration if they are certified by the manufacturer or by an independent source.

6.11.2 Transfer the stock standard solutions into Teflon-sealed screw-cap bottles. Store at 4 °C and protect from light. Stock standard solutions should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

6.11.3 Stock standard solutions must be replaced after six months, or sooner if comparison with check standards indicates a problem.

6.12 Quality control check sample concentrate—See Section 8.2.1.

7. Calibration

7.1 Establish gas chromatographic operating conditions equivalent to those given in Table 1. The gas chromatographic system can be calibrated using the external standard technique (Section 7.2) or the internal standard technique (Section 7.3).

7.2 External standard calibration procedure:

7.2.1 Prepare calibration standards at a minimum of three concentration levels for each parameter of interest by adding volumes of one or more stock standards to a volumetric flask and diluting to volume with methanol. One of the external standards should be at a concentraton near, but above, the MDL (Table 1) and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the detector.

7.2.2 Using injections of 2 to 5 μL, analyze each calibration standard according to Section 12 and tabulate peak height or area responses against the mass injected. The results can be used to prepare a calibration curve for each compound. Alternatively, if the ratio of response to amount injected (calibration factor) is a constant over the working range (< 10% relative standard deviation, RSD), linearity through the origin can be assumed and the average ratio or calibration factor can be used in place of a calibration curve.

7.3 Internal standard calibration procedure—To use this approach, the analyst must select one or more internal standards that are similar in analytical behavior to the compounds of interest. The analyst must further demonstrate that the measurement of the internal standard is not affected by method or matrix interferences. Because of these limitations, no internal standard can be suggested that is applicable to all samples.

7.3.1 Prepare calibration standards at a minimum of three concentration levels for each parameter of interest by adding volumes of one or more stock standards to a volumetric flask. To each calibration standard, add a known constant amount of one or more internal standards, and dilute to volume with methanol. One of the standards should be at a concentration near, but above, the MDL and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the detector.

7.3.2 Using injections of 2 to 5 µL, analyze each calibration standard according to Section 12 and tabulate peak height or area responses against concentration for each compound and internal standard. Calculate response factors (RF) for each compound using Equation 1.

$$RF = \frac{(A_s)(C_{is})}{(A_{is})(C_s)}$$

Equation 1

where:

A_s = Response for the parameter to be measured.

A_{is} = Response for the internal standard.

C_{is} = Concentration of the internal standard (µg/L).

C_s = Concentration of the parameter to be measured (µg/L).

If the RF value over the working range is a constant (<10% RSD), the RF can be assumed to be invariant and the average RF can be used for calculations. Alternatively, the results can be used to plot a calibration curve of response ratios, A_s/A_{is}, vs. RF.

7.4 The working calibration curve, calibration factor, or RF must be verified on each working day by the measurement of one or more calibration standards. If the response for any parameter varies from the predicted response by more than ±15%, a new calibration curve must be prepared for that compound.

7.5 Before using any cleanup procedure, the analyst must process a series of calibration standards through the procedure to validate elution patterns and the absence of interferences from the reagents.

8. Quality Control

8.1 Each laboratory that uses this method is required to operate a formal quality control program. The minimum requirements of this program consist of an initial demonstration of laboratory capability and an ongoing analysis of spiked samples to evaluate and document data quality. The laboratory must maintain records to document the quality of data that is generated. Ongoing data quality checks are compared with established performance criteria to determine if the results of analyses meet the performance characteristics of the method. When results of sample spikes indicate atypical method performance, a quality control check standard must be analyzed to confirm that the measurements were performed in an in-control mode of operation.

8.1.1 The analyst must make an initial, one-time, demonstration of the ability to generate acceptable accuracy and precision with this method. This ability is established as described in Section 8.2.

8.1.2 In recognition of advances that are occurring in chromatography, the analyst is permitted certain options (detailed in Sections 10.4, 11.1, and 12.2) to improve the separations or lower the cost of measurements. Each time such a modification is made to the method, the analyst is required to repeat the procedure in Section 8.2.

8.1.3 Before processing any samples, the analyst must analyze a reagent water blank to demonstrate that interferences from the analytical system and glassware are under control. Each time a set of samples is extracted or reagents are changed, a reagent water blank must be processed as a safeguard against laboratory contamination.

8.1.4 The laboratory must, on an ongoing basis, spike and analyze a minimum of 10% of all samples to monitor and evaluate laboratory data quality. This procedure is described in Section 8.3.

8.1.5 The laboratory must, on an ongoing basis, demonstrate through the analyses of quality control check standards that the operation of the measurement system is in control. This procedure is described in Section 8.4. The frequency of the check standard analyses is equivalent to 10% of all samples analyzed but may be reduced if spike recoveries from samples (Section 8.3) meet all specified quality control criteria.

8.1.6 The laboratory must maintain performance records to document the quality of data that is generated. This procedure is described in Section 8.5.

8.2 To establish the ability to generate acceptable accuracy and precision, the analyst must perform the following operations.

8.2.1 A quality control (QC) check sample concentrate is required containing each parameter of interest at a concentration of 20 µg/mL in methanol. The QC check sample concentrate must be obtained from the U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory in Cincinnati, Ohio, if available. If not available from that source, the QC check sample concentrate must be obtained from another external source. If not available from either source above, the QC check sample concentrate must be prepared by the laboratory using stock standards prepared independently from those used for calibration.

8.2.2 Using a pipet, prepare QC check samples at a concentration of 20 μg/L by adding 1.00 mL of QC check sample concentrate to each of four 1-L aliquots of reagent water.

8.2.3 Analyze the well-mixed QC check samples according to the method beginning in Section 10.

8.2.4 Calculate the average recovery ($\bar{X}$) in μg/L and the standard deviation of the recovery (s) in μg/L, for each parameter using the four results.

8.2.5 For each parameter compare s and $\bar{X}$ with the corresponding acceptance criteria for precision and accuracy, respectively, found in Table 2. If s and $\bar{X}$ for all parameters of interest meet the acceptance criteria, the system performance is acceptable and analysis of actual samples can begin. If any individual s exceeds the precision limit or any individual $\bar{X}$ falls outside the range for accuracy, the system performance is unacceptable for that parameter. Locate and correct the source of the problem and repeat the test for all parameters of interest beginning with Section 8.2.2.

8.3 The laboratory must, on an ongoing basis, spike at least 10% of the samples from each sample site being monitored to assess accuracy. For laboratories analyzing one to ten samples per month, at least one spiked sample per month is required.

8.3.1 The concentration of the spike in the sample should be determined as follows:

8.3.1.1 If, as in compliance monitoring, the concentration of a specific parameter in the sample is being checked against a regulatory concentration limit, the spike should be at that limit or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.2 If the concentration of a specific parameter in the sample is not being checked against a limit specific to that parameter, the spike should be at 20 μg/L or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.3 If it is impractical to determine background levels before spiking (e.g., maximum holding times will be exceeded), the spike concentration should be (1) the regulatory concentration limit, if any; or, if none (2) the larger of either 5 times higher than the expected background concentration or 20 μg/L.

8.3.2 Analyze one sample aliquot to determine the background concentration (B) of each parameter. If necessary, prepare a new QC check sample concentrate (Section 8.2.1) appropriate for the background concentrations in the sample. Spike a second sample aliquot with 1.0 mL of the QC check sample concentrate and analyze it to determine the concentration after spiking (A) of each parameter. Calculate each percent recovery (P) as 100(A-B)%/T, where T is the known true value of the spike.

8.3.3 Compare the percent recovery (P) for each parameter with the corresponding QC acceptance criteria found in Table 2. These acceptance criteria were caluclated to include an allowance for error in measurement of both the background and spike concentrations, assuming a spike to background ratio of 5:1. This error will be accounted for to the extent that the analyst's spike to background ratio approaches 5:1.[19] If spiking was performed at a concentration lower than 20 μg/L, the analyst must use either the QC acceptance criteria in Table 2, or optional QC acceptance criteria caluclated for the specific spike concentration. To calculate optional acceptance crtieria for the recovery of a parameter: (1) Calculate accuracy (X') using the equation in Table 3, substituting the spike concentration (T) for C; (2) calculate overall precision (S') using the equation in Table 3, substituting X' for $\bar{X}$; (3) calculate the range for recovery at the spike concentration as $(100\ X'/T) \pm 2.44(100\ S'/T)\%$.[19]

8.3.4 If any individual P falls outside the designated range for recovery, that parameter has failed the acceptance criteria. A check standard containing each parameter that failed the criteria must be analyzed as described in Section 8.4.

8.4 If any parameter fails the acceptance criteria for recovery in Section 8.3, a QC check standard containing each parameter that failed must be prepared and analyzed.

Note: The frequency for the required analysis of a QC check standard will depend upon the number of parameters being simultaneously tested, the complexity of the sample matrix, and the performance of the laboratory.

8.4.1 Prepare the QC check standard by adding 1.0 mL of QC check sample concentrate (Section 8.2.1 or 8.3.2) to 1 L of reagent water. The QC check standard needs only to contain the parameters that failed criteria in the test in Section 8.3.

8.4.2 Analyze the QC check standard to determine the concentration measured (A) of each parameter. Calculate each percent recovery (P_s) as 100 (A/T)%, where T is the true value of the standard concentration.

8.4.3 Compare the percent recovery (P_s) for each parameter with the corresponding QC acceptance criteria found in Table 2. Only parameters that failed the test in Section 8.3 need to be compared with these criteria. If the recovery of any such parameter

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falls outside the designated range, the laboratory performance for that parameter is judged to be out of control, and the problem must be immediately identified and corrected. The analytical result for that parameter in the unspiked sample is suspect and may not be reported for regulatory compliance purposes.

8.5 As part of the QC program for the laboratory, method accuracy for wastewater samples must be assessed and records must be maintained. After the analysis of five spiked wastewater samples as in Section 8.3, calculate the average percent recovery ($\bar{P}$) and the standard deviation of the percent recovery (s_p). Express the accuracy assessment as a percent recovery interval from $\bar{P}-2s_p$ to $\bar{P}+2s_p$. If $\bar{P}=90\%$ and $s_p=10\%$, for example, the accuracy interval is expressed as 70–110%. Update the accuracy assessment for each parameter on a regular basis (e.g. after each five to ten new accuracy measurements).

8.6 It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Field duplicates may be analyzed to assess the precision of the environmental measurements. When doubt exists over the identification of a peak on the chromatogram, confirmatory techniques such as gas chromatography with a dissimilar column, specific element detector, or mass spectrometer must be used. Whenever possible, the laboratory should analyze standard reference materials and participate in relevant performance evaluation studies.

9. Sample Collection, Preservation, and Handling

9.1 Grab samples must be collected in glass containers. Conventional sampling practices [10] should be followed, except that the bottle must not be prerinsed with sample before collection. Composite samples should be collected in refrigerated glass containers in accordance with the requirements of the program. Automatic sampling equipment must be as free as possible of Tygon tubing and other potential sources of contamination.

9.2 All samples must be iced or refrigerated at 4 °C from the time of collection until extraction. Fill the sample bottles and, if residual chlorine is present, add 80 mg of sodium thiosulfate per liter of sample and mix well. EPA Methods 330.4 and 330.5 may be used for measurement of residual chlorine.[10] Field test kits are available for this purpose. If N-nitrosodiphenylamine is to be determined, adjust the sample pH to 7 to 10 with sodium hydroxide solution or sulfuric acid.

9.3 All samples must be extracted within 7 days of collection and completely analyzed within 40 days of extraction.[4]

9.4 Nitrosamines are known to be light sensitive.[7] Samples should be stored in amber or foil-wrapped bottles in order to minimize photolytic decomposition.

10. Sample Extraction

10.1 Mark the water meniscus on the side of the sample bottle for later determination of sample volume. Pour the entire sample into a 2-L separatory funnel. Check the pH of the sample with wide-range pH paper and adjust to within the range of 5 to 9 with sodium hydroxide solution or sulfuric acid.

10.2 Add 60 mL of methylene chloride to the sample bottle, seal, and shake 30 s to rinse the inner surface. Transfer the solvent to the separatory funnel and extract the sample by shaking the funnel for 2 min with periodic venting to release excess pressure. Allow the organic layer to separate from the water phase for a minimum of 10 min. If the emulsion interface between layers is more than one-third the volume of the solvent layer, the analyst must employ mechanical techniques to complete the phase separation. The optimum technique depends upon the sample, but may include stirring, filtration of the emulsion through glass wool, centrifugation, or other physical methods. Collect the methylene chloride extract in a 250-mL Erlenmeyer flask.

10.3 Add a second 60-mL volume of methylene chloride to the sample bottle and repeat the extraction procedure a second time, combining the extracts in the Erlenmeyer flask. Perform a third extraction in the same manner.

10.4 Assemble a Kuderna-Danish (K-D) concentrator by attaching a 10-mL concentrator tube to a 500-mL evaporative flask. Other concentration devices or techniques may be used in place of the K-D concentrator if the requirements of Section 8.2 are met.

10.5 Add 10 mL of hydrochloric acid to the combined extracts and shake for 2 min. Allow the layers to separate. Pour the combined extract through a solvent-rinsed drying column containing about 10 cm of anhydrous sodium sulfate, and collect the extract in the K-D concentrator. Rinse the Erlenmeyer flask and column with 20 to 30 mL of methylene chloride to complete the quantitative transfer.

10.6 Add one or two clean boiling chips to the evaporative flask and attach a three-ball Snyder column. Prewet the Snyder column by adding about 1 mL of methylene chloride to the top. Place the K-D apparatus on a hot water bath (60 to 65°C) so that the concentrator tube is partially immersed in the hot water, and the entire lower rounded surface of the flask is bathed with hot vapor. Adjust the vertical position of the apparatus and the water temperature as required to complete the concentration in 15 to 20 min. At the proper rate of distillation the balls of the column will actively chatter but the chambers will not flood with condensed solvent. When the apparent volume of liquid reaches 1 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 min.

10.7 Remove the Snyder column and rinse the flask and its lower joint into the concentrator tube with 1 to 2 mL of methylene chloride. A 5-mL syringe is recommended for this operation. Stopper the concentrator tube and store refrigerated if further processing will not be performed immediately. If the extract will be stored longer than two days, it should be transferred to a Teflon-sealed screw-cap vial. If N-nitrosodiphenylamine is to be measured by gas chromatography, the analyst must first use a cleanup column to eliminate diphenylamine interference (Section 11). If N-nitrosodiphenylamine is of no interest, the analyst may proceed directly with gas chromatographic analysis (Section 12).

10.8 Determine the original sample volume by refilling the sample bottle to the mark and transferring the liquid to a 1000-mL graduated cylinder. Record the sample volume to the nearest 5 mL.

11. Cleanup and Separation

11.1 Cleanup procedures may not be necessary for a relatively clean sample matrix. If particular circumstances demand the use of a cleanup procedure, the analyst may use either procedure below or any other appropriate procedure. However, the analyst first must demonstrate that the requirements of Section 8.2 can be met using the method as revised to incorporate the cleanup procedure. Diphenylamine, if present in the original sample extract, must be separated from the nitrosamines if N-nitrosodiphenylamine is to be determined by this method.

11.2 If the entire extract is to be cleaned up by one of the following procedures, it must be concentrated to 2.0 mL. To the concentrator tube in Section 10.7, add a clean boiling chip and attach a two-ball micro-Snyder column. Prewet the column by adding about 0.5 mL of methylene chloride to the top. Place the micr-K-D apparatus on a hot water bath (60 to 65 °C) so that the concentrator tube is partially immersed in the hot water. Adjust the vertical position of the apparatus and the water temperature as required to complete the concentration in 5 to 10 min. At the proper rate of distillation the balls of the column will actively chatter but the chambers will not flood. When the apparent volume of liquid reaches about 0.5 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 min. Remove the micro-Snyder column and rinse its lower joint into the concentrator tube with 0.2 mL of methylene chloride. Adjust the final volume to 2.0 mL and proceed with one of the following cleanup procedures.

11.3 Florisil column cleanup for nitrosamines:

11.3.1 Place 22 g of activated Florisil into a 22-mm ID chromatographic column. Tap the column to settle the Florisil and add about 5 mm of anhydrous sodium sulfate to the top.

11.3.2 Preelute the column with 40 mL of ethyl ether/pentane (15+85)(V/V). Discard the eluate and just prior to exposure of the sodium sulfate layer to the air, quantitatively transfer the 2-mL sample extract onto the column using an additional 2 mL of pentane to complete the transfer.

11.3.3 Elute the column with 90 mL of ethyl ether/pentane (15+85)(V/V) and discard the eluate. This fraction will contain the diphenylamine, if it is present in the extract.

11.3.4 Next, elute the column with 100 mL of acetone/ethyl ether (5+95)(V/V) into a 500-mL K-D flask equipped with a 10-mL concentrator tube. This fraction will contain all of the nitrosamines listed in the scope of the method.

11.3.5 Add 15 mL of methanol to the collected fraction and concentrate as in Section 10.6, except use pentane to prewet the column and set the water bath at 70 to 75 °C. When the apparatus is cool, remove the Snyder column and rinse the flask and its lower joint into the concentrator tube with 1 to 2 mL of pentane. Analyze by gas chromatography (Section 12).

11.4 Alumina column cleanup for nitrosamines:

11.4.1 Place 12 g of the alumina preparation (Section 6.10) into a 10-mm ID chromatographic column. Tap the column to settle the alumina and add 1 to 2 cm of anhydrous sodium sulfate to the top.

11.4.2 Preelute the column with 10 mL of ethyl ether/pentane (3+7)(V/V). Discard the eluate (about 2 mL) and just prior to exposure of the sodium sulfate layer to the air, quantitatively transfer the 2 mL sample extract onto the column using an additional 2 mL of pentane to complete the transfer.

11.4.3 Just prior to exposure of the sodium sulfate layer to the air, add 70 mL of ethyl ether/pentane (3+7)(V/V). Discard the first 10 mL of eluate. Collect the remainder of the eluate in a 500-mL K-D flask equipped with a 10 mL concentrator tube. This fraction contains N-nitrosodiphenylamine and probably a small amount of N-nitrosodi-n-propylamine.

11.4.4 Next, elute the column with 60 mL of ethyl ether/pentane (1+1)(V/V), collecting the eluate in a second K-D flask equipped with a 10-mL concentrator tube.

Add 15 mL of methanol to the K-D flask. This fraction will contain N-nitrosodimethylamine, most of the N-nitrosodi-n-propylamine and any diphenylamine that is present.

11.4.5 Concentrate both fractions as in Section 10.6, except use pentane to prewet the column. When the apparatus is cool, remove the Snyder column and rinse the flask and its lower joint into the concentrator tube with 1 to 2 mL of pentane. Analyze the fractions by gas chromatography (Section 12).

12. Gas Chromatography

12.1 N-nitrosodiphenylamine completely reacts to form diphenylamine at the normal operating temperatures of a GC injection port (200 to 250 °C). Thus, N-nitrosodiphenylamine is chromatographed and detected as diphenylamine. Accurate determination depends on removal of diphenylamine that may be present in the original extract prior to GC analysis (See Section 11).

12.2 Table 1 summarizes the recommended operating conditions for the gas chromatograph. Included in this table are retention times and MDL that can be achieved under these conditions. Examples of the separations achieved by Column 1 are shown in Figures 1 and 2. Other packed or capillary (open-tubular) columns, chromatographic conditions, or detectors may be used if the requirements of Section 8.2 are met.

12.3 Calibrate the system daily as described in Section 7.

12.4 If the extract has not been subjected to one of the cleanup procedures in Section 11, it is necessary to exchange the solvent from methylene chloride to methanol before the thermionic detector can be used. To a 1 to 10-mL volume of methylene chloride extract in a concentrator tube, add 2 mL of methanol and a clean boiling chip. Attach a two-ball micro-Snyder column to the concentrator tube. Prewet the column by adding about 0.5 mL of methylene chloride to the top. Place the micro-K-D apparatus on a boiling (100 °C) water bath so that the concentrator tube is partially immersed in the hot water. Adjust the vertical position of the apparatus and the water temperature as required to complete the concentration in 5 to 10 min. At the proper rate of distillation the balls of the colum will actively chatter but the chambers wil not flood. When the apparent volume o liquid reaches about 0.5 mL, remove the K D apparatus and allow it to drain and coo for at least 10 min. Remove the micro Snyder column and rinse its lower joint int the concentrator tube with 0.2 mL of methanol. Adjust the final volume to 2.0 mL.

12.5 If the internal standard calibratio procedure is being used, the internal standard must be added to the sample extra and mixed thoroughly immediately befor injection into the gas chromatograph.

12.6 Inject 2 to 5 µL of the sample e tract or standard into the gas chromatograph using the solvent-flush technique. Smaller (1.0 µL) volumes may be injected automatic devices are employed. Record th volume injected to the nearest 0.05 µL, an the resulting peak size in area or pea height units.

12.7 Identify the parameters in th sample by comparing the retention times o the peaks in the sample chromatogram wit those of the peaks in standard chromatograms. The width of the retention tim window used to make identifications shoul be based upon measurements of actual retention time variations of standards ove the course of a day. Three times the standard deviation of a retention time for a compound can be used to calculate a suggeste window size; however, the experience of th analyst should weigh heavily in the interpretation of chromatograms.

12.8 If the response for a peak exceed the working range of the system, dilute th extract and reanalyze.

12.9 If the measurement of the peak response is prevented by the presence of interferences, further cleanup is required.

13. Calculations

13.1 Determine the concentration of individual compounds in the sample.

13.1.1 If the external standard calibration procedure is used, calculate the amoun of material injected from the peak respons using the calibration curve or calibratio factor determined in Section 7.2.2. The concentration in the sample can be calculate from Equation 2.

$$\text{Concentration }(\mu/\text{L})=\frac{(\text{A})(\text{V}_t)}{(\text{V}_i)(\text{V}_s)}$$

Equation 2

where:

A = Amount of material injected (ng).

V_i = Volume of extract injected (µL).

V_t = Volume of total extract (µL).

V_s = Volume of water extracted (mL).

13.1.2 If the internal standard calibrati procedure is used, calculate the concent tion in the sample using the response factor (RF) determined in Section 7.3.2 and Equation 3.

$$\text{Concentration } (\mu g/L) = \frac{(A_s)(I_s)}{(A_{is})(RF)(V_o)}$$

Equation 3

where:

A_s=Response for the parameter to be measured.

A_{is}=Response for the internal standard.

I_s=Amount of internal standard added to each extract (µg).

V_o=Volume of water extracted (L).

13.2 Report results in µg/L without correction for recovery data. All QC data obtained should be reported with the sample results.

14. Method Performance

14.1 The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero.[3] The MDL concentrations listed in Table 1 were obtained using reagent water.[22] Similar results were achieved using representative wastewaters. The MDL actually achieved in a given analysis will vary depending on instrument sensitivity and matrix effects.

14.2 This method has been tested for linearity of spike recovery from reagent water and has been demonstrated to be applicable over the concentration range from 4 x MDL to 1000 x MDL.[22]

14.3 This method was tested by 17 laboratories using reagent water, drinking water, surface water, and three industrial wastewaters spiked at six concentrations over the range 0.8 to 55 µg/L.[23] Single operator precision, overall precision, and method accuracy were found to be directly related to the concentration of the parameter and essentially independent of the sample matrix. Linear equations to describe these relationships are presented in Table 3.

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TABLE 1.—CHROMATOGRAPHIC CONDITIONS AND METHOD DETECTION LIMITS

Parameter	Retention time (min)		Method detection limit (µg/L)
	Column 1	Column 2	
N-Nitrosodimethylamine	4.1	0.88	0.15
N-Nitrosodi-n-propylamine	12.1	4.2	.46
N-Nitrosodiphenylamine [a]	[b] 12.8	[c] 6.4	.81

Column 1 conditions: Chromosorb W-AW (80/100 mesh) coated with 10% Carbowax 20 M/2% KOH packed in a 1.8 m long x 4mm ID glass column with helium carrier gas at 40 mL/min flow rate. Column temperature held isothermal at 110 °C, except where otherwise indicated.

Column 2 conditions: Supelcoport (100/120 mesh) coated with 10% SP-2250 packed in a 1.8 m long x 4 mm ID glass column with helium carrier gas at 40 mL/min flow rate. Column temperature held isothermal at 120 °C, except where otherwise indicated.

[a] Measured as diphenylamine.
[b] 220 °C column temperature.
[c] 210 °C column temperature.

TABLE 2.—QC ACCEPTANCE CRITERIA—METHOD 607

Parameter	Test conc. (µg/L)	Limit for s (µg/L)	Range for $\bar{X}$ (µg/L)	Range for P, P_s (percent)
N-Nitrosodimethylamine	20	3.4	4.6-20.0	13-109
N-Nitrosodiphenyl	20	6.1	2.1-24.5	D-139
N-Nitrosodi-n-propylamine	20	5.7	11.5-26.8	45-146

s=Standard deviation for four rocovery measurements, in µg/L (Section 8.2.4).
$\bar{X}$=Average recovery for four recovery measurements, in µg/L (Section 8.2.4).
P, P_s=Percent recovery measured (Section 8.3.2, Section 8.4.2).
D=Detected; result must be greater than zero.

NOTE: These criteria are based directly upon the method performance data in Table 3. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table 3.

TABLE 3.—METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION—METHOD 607

Parameter	Accuracy, as recovery, X' (µg/L)	Single analyst precision, s_r' (µg/L)	Overall precision, S' (µg/L)
N-Nitrosodimethylamine	$0.37C+0.06$	$0.25\bar{X}-0.04$	$0.25\bar{X}+0.11$
N-Nitrosodiphenylamine	$0.64C+0.52$	$0.36\bar{X}-1.53$	$0.46\bar{X}-0.47$
N-Nitrosodi-n-propylamine	$0.96C-0.07$	$0.15\bar{X}+0.13$	$0.21\bar{X}+0.15$

X'=Expected recovery for one or more measurements of a sample containing a concentration of C, in µg/L.
s_r'=Expected single analyst standard deviation of measurements at an average concentration found of $\bar{X}$, in µg/L.
S'=Expected interlaboratory standard deviation of measurements at an average concentration found of $\bar{X}$, in µg/L.
C=True value for the concentration, in µg/L.
$\bar{X}$=Average recovery found for measurements of samples containing a concentration of C, in µg/L.

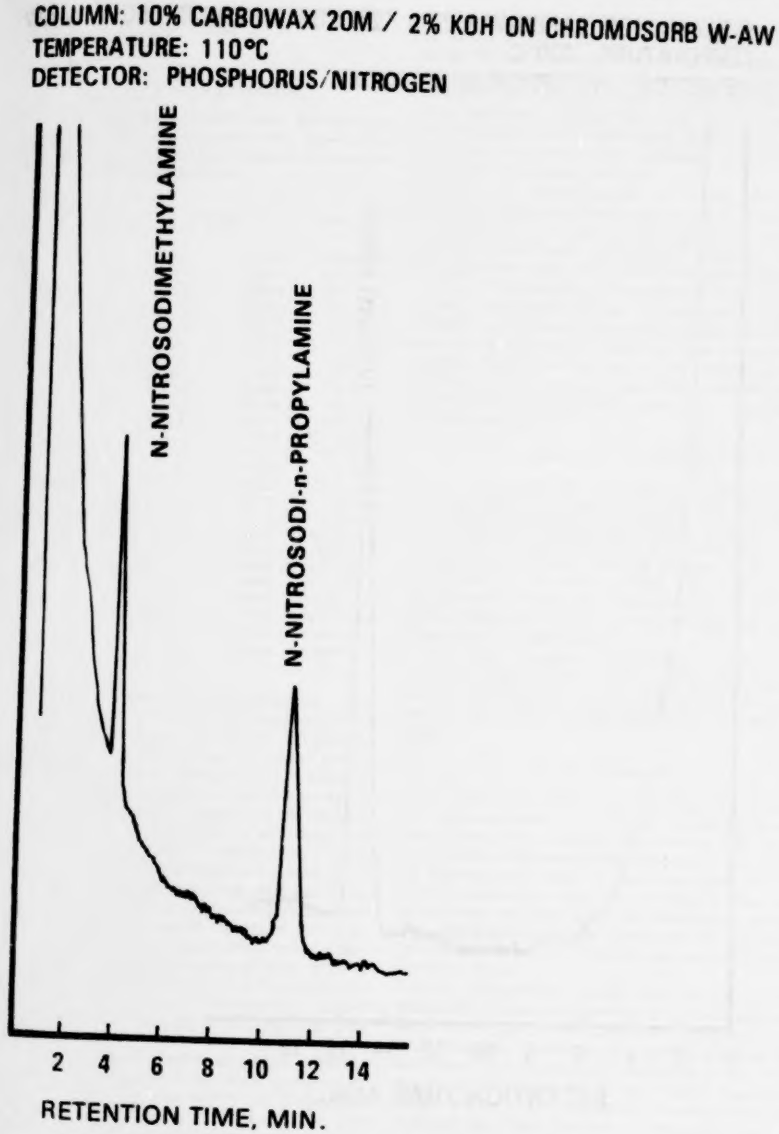

Figure 1. Gas chromatogram of nitrosamines.

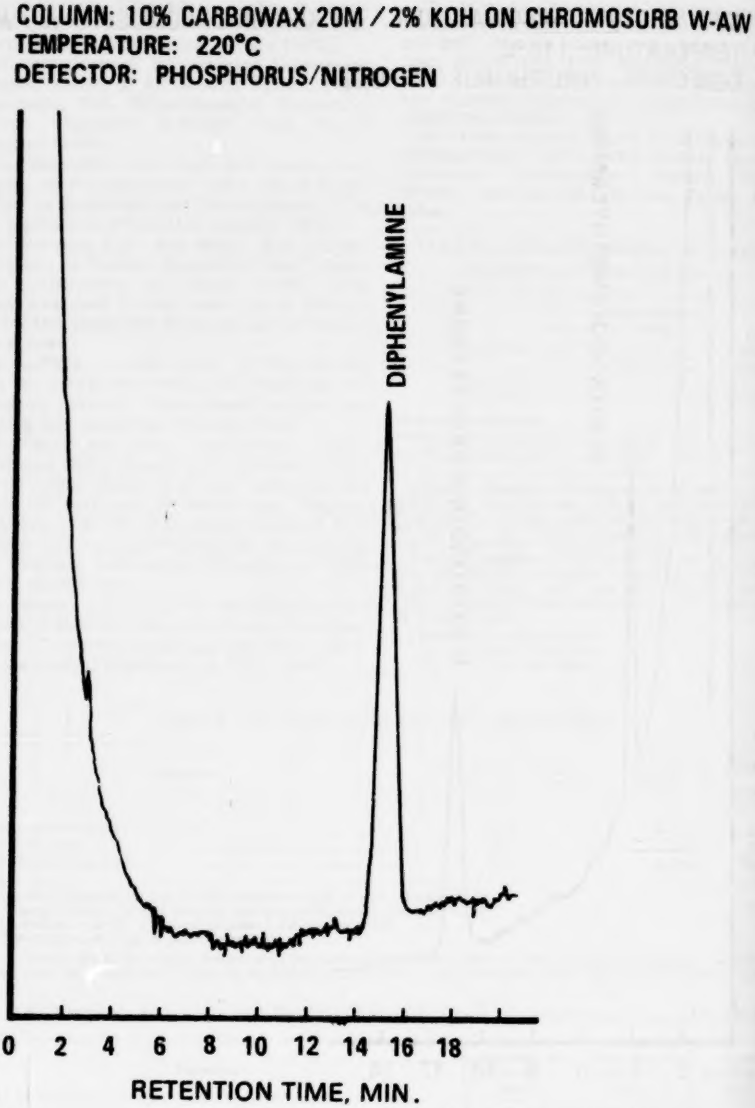

Figure 2. Gas chromatogram of N-nitrosodiphenylamine as diphenylamine.

METHOD 608—ORGANOCHLORINE PESTICIDES AND PCBs

1. Scope and Application

1.1 This method covers the determination of certain organochlorine pesticides and PCBs. The following parameters can be determined by this method:

Parameter	STORET No.	CAS No.
Aldrin	39330	309-00-2
α-BHC	39337	319-84-6
β-BHC	39338	319-85-7
δ-BHC	34259	319-86-8
γ-BHC	39340	58-89-9
Chlordane	39350	57-74-9
4,4′-DDD	39310	72-54-8
4,4′-DDE	39320	72-55-9
4,4′-DDT	39300	50-29-3
Dieldrin	39380	60-57-1
Endosulfan I	34361	959-98-8
Endosulfan II	34356	33212-65-9
Endosulfan sulfate	34351	1031-07-8
Eldrin	39390	72-20-8
Endrin aldehyde	34366	7421-93-4
Heptachlor	39410	76-44-8
Heptachlor epoxide	39420	1024-57-3
Toxaphene	39400	8001-35-2
PCB-1016	34671	12674-11-2
PCB-1221	39488	1104-28-2
PCB-1232	39492	11141-16-5
PCB-1242	39496	53469-21-9
PCB-1248	39500	12672-29-6
PCB-1254	39504	11097-69-1
PCB-1260	39508	11096-82-5

1.2 This is a gas chromatographic (GC) method applicable to the determination of the compounds listed above in municipal and industrial discharges as provided under 40 CFR 136.1. When this method is used to analyze unfamiliar samples for any or all of the compounds above, compound identifications should be supported by at least one additional qualitative technique. This method describes analytical conditions for a second gas chromatographic column that can be used to confirm measurements made with the primary column. Method 625 provides gas chromatograph/mass spectrometer (GC/MS) conditions appropriate for the qualitative and quantitative confirmation of results for all of the parameters listed above, using the extract produced by this method.

1.3 The method detection limit (MDL, defined in Section 14.1)[1] for each parameter is listed in Table 1. The MDL for a specific wastewater may differ from those listed, depending upon the nature of interferences in the sample matrix.

1.4 The sample extraction and concentration steps in this method are essentially the same as in Methods 606, 609, 611, and 612. Thus, a single sample may be extracted to measure the parameters included in the scope of each of these methods. When cleanup is required, the concentration levels must be high enough to permit selecting aliquots, as necessary, to apply appropriate cleanup procedures. The analyst is allowed the latitude, under Section 12, to select chromatographic conditions appropriate for the simultaneous measurement of combinations of these parameters.

1.5 Any modification of this method, beyond those expressly permitted, shall be considered as a major modification subject to application and approval of alternate test procedures under 40 CFR 136.4 and 136.5.

1.6 This method is restricted to use by or under the supervision of analysts experienced in the use of a gas chromatograph and in the interpretation of gas chromatograms. Each analyst must demonstrate the ability to generate acceptable results with this method using the procedure described in Section 8.2.

2. Summary of Method

2.1 A measured volume of sample, approximately 1-L, is extracted with methylene chloride using a separatory funnel. The methylene chloride extract is dried and exchanged to hexane during concentration to a volume of 10 mL or less. The extract is separated by gas chromatography and the parameters are then measured with an electron capture detector.[2]

2.2 The method provides a Florisil column cleanup procedure and an elemental sulfur removal procedure to aid in the elimination of interferences that may be encountered.

3. Interferences

3.1 Method interferences may be caused by contaminants in solvents, reagents, glassware, and other sample processing hardware that lead to discrete artifacts and/or elevated baselines in gas chromatograms. All of these materials must be routinely demonstrated to be free from interferences under the conditions of the analysis by running laboratory reagent blanks as described in Section 8.1.3.

3.1.1 Glassware must be scrupulously cleaned.[3] Clean all glassware as soon as possible after use by rinsing with the last solvent used in it. Solvent rinsing should be followed by detergent washing with hot water, and rinses with tap water and distilled water. The glassware should then be drained dry, and heated in a muffle furnace at 400 °C for 15 to 30 min. Some thermally stable materials, such as PCBs, may not be eliminated by this treatment. Solvent rinses with acetone and pesticide quality hexane may be substituted for the muffle furnace heating. Thorough rinsing with such solvents usually eliminates PCB interference.

Volumetric ware should not be heated in a muffle furnace. After drying and cooling, glassware should be sealed and stored in a clean environment to prevent any accumulation of dust or other contaminants. Store inverted or capped with aluminum foil.

3.1.2 The use of high purity reagents and solvents helps to minimize interference problems. Purification of solvents by distillation in all-glass systems may be required.

3.2 Interferences by phthalate esters can pose a major problem in pesticide analysis when using the electron capture detector. These compounds generally appear in the chromatogram as large late eluting peaks, especially in the 15 and 50% fractions from Florisil. Common flexible plastics contain varying amounts of phthalates. These phthalates are easily extracted or leached from such materials during laboratory operations. Cross contamination of clean glassware routinely occurs when plastics are handled during extraction steps, especially when solvent-wetted surfaces are handled. Interferences from phthalates can best be minimized by avoiding the use of plastics in the laboratory. Exhaustive cleanup of reagents and glassware may be required to eliminate background phthalate contamination.[4,5] The interferences from phthalate esters can be avoided by using a microcoulometric or electrolytic conductivity detector.

3.3 Matrix interferences may be caused by contaminants that are co-extracted from the sample. The extent of matrix interferences will vary considerably from source to source, depending upon the nature and diversity of the industrial complex or municipality being sampled. The cleanup procedures in Section 11 can be used to overcome many of these interferences, but unique samples may require additional cleanup approaches to achieve the MDL listed in Table 1.

4. Safety

4.1 The toxicity or carcinogenicity of each reagent used in this method has not been precisely defined; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material data handling sheets should also be made available to all personnel involved in the chemical analysis. Additional references to laboratory safety are available and have been identified [6-8] for the information of the analyst.

4.2 The following parameters covered by this method have been tentatively classified as known or suspected, human or mammalian carcinogens: 4,4′-DDT, 4,4′-DDD, the BHCs, and the PCBs. Primary standards of these toxic compounds should be prepared in a hood. A NIOSH/MESA approved toxic gas respirator should be worn when the analyst handles high concentrations of these toxic compounds.

5. Apparatus and Materials

5.1 Sampling equipment, for discrete or composite sampling.

5.1.1 Grab sample bottle—1-L or 1-qt, amber glass, fitted with a screw cap lined with Teflon. Foil may be substituted for Teflon if the sample is not corrosive. If amber bottles are not available, protect samples from light. The bottle and cap liner must be washed, rinsed with acetone or methylene chloride, and dried before use to minimize contamination.

5.1.2 Automatic sampler (optional)—The sampler must incorporate glass sample containers for the collection of a minimum of 250 mL of sample. Sample containers must be kept refrigerated at 4°C and protected from light during composting. If the sampler uses a peristaltic pump, a minimum length of compressible silicone rubber tubing may be used. Before use, however, the compressible tubing should be thoroughly rinsed with methanol, followed by repeated rinsings with distilled water to minimize the potential for contamination of the sample. An integrating flow meter is required to collect flow proportional composites.

5.2. Glassware (All specifications are suggested. Catalog numbers are included for illustration only.):

5.2.1 Separatory funnel—2-L, with Teflon stopcock.

5.2.2 Drying column—Chromatographic column, approximately 400 mm long × 19 mm ID, with coarse frit filter disc.

5.2.3 Chromatographic column—400 mm long × 22 mm ID, with Teflon stopcock and coarse frit filter disc (Kontes K-42054 or equivalent).

5.2.4 Concentrator tube, Kuderna-Danish—10-mL, graduated (Kontes K-570050-1025 or equivalent). Calibration must be checked at the volumes employed in the test. Ground glass stopper is used to prevent evaporation of extracts.

5.2.5 Evaporative flask, Kuderna-Danish—500-mL (Kontes K-570001-0500 or equivalent). Attach to concentrator tube with springs.

5.2.6 Snyder column, Kuderna/Danish—Three-ball macro (Kontes K-503000-0121 or equivalent).

5.2.7 Vials—10 to 15-mL, amber glass, with Teflon-lined screw cap.

5.3 Boiling chips—Approximately 10/40 mesh. Heat to 400°C for 30 min or Soxhlet extract with methylene chloride.

5.4 Water bath—Heated, with concentric ring cover, capable of temperature control (±2°C). The bath should be used in a hood.

5.5 Balance—Analytical, capable of accurately weighing 0.0001 g.

5.6 Gas chromatograph—An analytical system complete with gas chromatograph suitable for on-column injection and all required accessories including syringes, analytical columns, gases, detector, and strip-chart recorder. A data system is recommended for measuring peak areas.

5.6.1 Column 1—1.8 m long × 4 mm ID glass, packed with 1.5% SP-2250/1.95% SP-2401 on Supelcoport (100/120 mesh) or equivalent. This column was used to develop the method performance statements in Section 14. Guidelines for the use of alternate column packings are provided in Section 12.1.

5.6.2 Column 2—1.8 m long × 4 mm ID glass, packed with 3% OV-1 on Supelcoport (100/120 mesh) or equivalent.

5.6.3 Detector—Electron capture detector. This detector has proven effective in the analysis of wastewaters for the parameters listed in the scope (Section 1.1), and was used to develop the method performance statements in Section 14. Guidelines for the use of alternate detectors are provided in Section 12.1.

6. Reagents

6.1 Reagent water—Reagent water is defined as a water in which an interferent is not observed at the MDL of the parameters of interest.

6.2 Sodium hydroxide solution (10 N)—Dissolve 40 g of NaOH (ACS) in reagent water and dilute to 100 mL.

6.3 Sodium thiosulfate—(ACS) Granular.

6.4 Sulfuric acid (1+1)—Slowly, add 50 mL to H_2SO_4 (ACS, sp. gr. 1.84) to 50 mL of reagent water.

6.5 Acetone, hexane, isooctane, methylene chloride—Pesticide quality or equivalent.

6.6 Ethyl ether—Nanograde, redistilled in glass if necessary.

6.6.1 Ethyl ether must be shown to be free of peroxides before it is used as indicated by EM Laboratories Quant test strips. (Available from Scientific Products Co., Cat. No. P1126-8, and other suppliers.)

6.6.2 Procedures recommended for removal of peroxides are provided with the test strips. After cleanup, 20 mL of ethyl alcohol preservative must be added to each liter of ether.

6.7 Sodium sulfate—(ACS) Granular, anhydrous. Purify by heating at 400 °C for 4 h in a shallow tray.

6.8 Florisil—PR grade (60/100 mesh). Purchase activated at 1250 °F and store in the dark in glass containers with ground glass stoppers or foil-lined screw caps. Before use, activate each batch at least 16 h at 130 °C in a foil-covered glass container and allow to cool.

6.9 Mercury—Triple distilled.

6.10 Copper powder—Activated.

6.11 Stock standard solutions (1.00 μg/μL)—Stock standard solutions can be prepared from pure standard materials or purchased as certified solutions.

6.11.1 Prepare stock standard solutions by accurately weighing about 0.0100 g of pure material. Dissolve the material in isooctane and dilute to volume in a 10-mL volumetric flask. Larger volumes can be used at the convenience of the analyst. When compound purity is assayed to be 96% or greater, the weight can be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards can be used at any concentration if they are certified by the manufacturer or by an independent source.

6.11.2 Transfer the stock standard solutions into Teflon-sealed screw-cap bottles. Store at 4 °C and protect from light. Stock standard solutions should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

6.11.3 Stock standard solutions must be replaced after six months, or sooner if comparison with check standards indicates a problem.

6.12 Quality control check sample concentrate—See Section 8.2.1.

7. Calibration

7.1 Establish gas chromatographic operating conditions equivalent to those given in Table 1. The gas chromatographic system can be calibrated using the external standard technique (Section 7.2) or the internal standard technique (Section 7.3).

7.2 External standard calibration procedure:

7.2.1 Prepare calibration standards at a minimum of three concentration levels for each parameter of interest by adding volumes of one or more stock standards to a volumetric flask and diluting to volume with isooctane. One of the external standards should be at a concentration near, but above, the MDL (Table 1) and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the detector.

7.2.2 Using injections of 2 to 5 μL, analyze each calibration standard according to Section 12 and tabulate peak height or area responses against the mass injected. The results can be used to prepare a calibration curve for each compound. Alternatively, if the ratio of response to amount injected (calibration factor) is a constant over the working range (<10% relative standard deviation, RSD), linearity through the origin can be assumed and the average ratio or calibration factor can be used in place of a calibration curve.

7.3 Internal standard calibration procedure—To use this approach, the analyst must select one or more internal standards that are similar in analytical behavior to the compounds of interest. The analyst must further demonstrate that the measurement of the internal standard is not affected by method or matrix interferences. Because of these limitations, no internal standard can be suggested that is applicable to all samples.

7.3.1 Prepare calibration standards at a minimum of three concentration levels for each parameter of interest by adding volumes of one or more stock standards to a volumetric flask. To each calibration standard, add a known constant amount of one or more internal standards, and dilute to volume with isooctane. One of the standards should be at a concentration near, but above, the MDL and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the detector.

7.3.2 Using injections of 2 to 5 μL, analyze each calibration standard according to Section 12 and tabulate peak height or area responses against concentration for each compound and internal standard. Calculate response factors (RF) for each compound using Equation 1.

$$RF = \frac{(A_s)(C_{is})}{(A_{is})(C_s)}$$

Equation 1

where:

A_s=Response for the parameter to be measured.

A_{is}=Response for the internal standard.

C_{is}=Concentration of the internal standard (μg/L).

C_s=Concentraton of the parameter to be measured (μg/L).

If the RF value over the working range is a constant (< 10% RSD), the RF can be assumed to be invariant and the average RF can be used for calculations. Alternatively, the results can be used to plot a calibration curve of response ratios, A_s/A_{is}, vs. RF.

7.4 The working calibration curve, calibration factor, or RF must be verified on each working day by the measurement of one or more calibration standards. If the response for any parameter varies from the predicted response by more than ±15%, the test must be repeated using a fresh calibra-
tion standard. Alternatively, a new calib
tion curve must be prepared for that co
pound.

7.5 The cleanup procedure in Section
utilizes Florisil column chromatograph
Florisil from different batches or sour
may vary in adsorptive capacity. To stan
ardize the amount of Florisil which is us
the use of lauric acid value[9] is suggest
The referenced procedure determines t
adsorption from hexane solution of lau
acid (mg) per g of Florisil. The amount
Florisil to be used for each column is cal
lated by dividing 110 by this ratio and mul
plying by 20 g.

7.6 Before using any cleanup procedu
the analyst must process a series of calib
tion standards through the procedure
validate elution patterns and the absence
interferences from the reagents.

8. Quality Control

8.1 Each laboratory that uses t
method is required to operate a formal qu
ity control program. The minimum requi
ments of this program consist of an init
demonstration of laboratory capability a
an ongoing analysis of spiked samples
evaluate and document data quality. T
laboratory must maintain records to doc
ment the quality of data that is generat
Ongoing data quality checks are compar
with established performance criteria to
termine if the results of analyses meet t
performance characteristics of the meth
When results of sample spikes indic
atypical method performance, a quality co
trol check standard must be analyzed
confirm that the measurements were p
formed in an in-control mode of operation

8.1.1 The analyst must make an initi
one-time, demonstration of the ability
generate acceptable accuracy and precis
with this method. This ability is establish
as described in Section 8.2.

8.1.2 In recognition of advances that a
occurring in chromatography, the analyst
permitted certain options (detailed in Se
tions 10.4, 11.1, and 12.1) to improve the se
arations or lower the cost of measuremen
Each time such a modification is made
the method, the analyst is required
repeat the procedure in Section 8.2.

8.1.3 Before processing any samples, t
analyst must analyze a reagent water bla
to demonstrate that interferences from t
analytical system and glassware are und
control. Each time a set of samples is e
tracted or reagents are changed, a reage
water blank must be processed as a saf
guard against laboratory contamination.

8.1.4 The laboratory must, on an ongoi
basis, spike and analyze a minimum of 10
of all samples to monitor and evaluate lab
ratory data quality. This procedure is d
scribed in Section 8.3.

8.1.5 The laboratory must, on an ongoing basis, demonstrate through the analyses of quality control check standards that the operation of the measurement system is in control. This procedure is described in Section 8.4. The frequency of the check standard analyses is equivalent to 10% of all samples analyzed but may be reduced if spike recoveries from samples (Section 8.3) meet all specified quality control criteria.

8.1.6 The laboratory must maintain performance records to document the quality of data that is generated. This procedure is described in Section 8.5.

8.2 To establish the ability to generate acceptable accuracy and precision, the analyst must perform the following operations.

8.2.1 A quality control (QC) check sample concentrate is required containing each single-component parameter of interest at the following concentrations in acetone: 4,4′-DDD, 10 μg/mL; 4,4′-DDT, 10 μg/mL; endosulfan II, 10 μg/mL; endosulfan sulfate, 10 μg/mL; endrin, 10 μg/mL; any other single-component pesticide, 2 μg/mL. If this method is only to be used to analyze for PCBs, chlordane, or toxaphene, the QC check sample concentrate should contain the most representative multicomponent parameter at a concentration of 50 μg/mL in acetone. The QC check sample concentrate must be obtained from the U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory in Cincinnati, Ohio, if available. If not available from that source, the QC check sample concentrate must be obtained from another external source. If not available from either source above, the QC check sample concentrate must be prepared by the laboratory using stock standards prepared independently from those used for calibration.

8.2.2 Using a pipet, prepare QC check samples at the test concentrations shown in Table 3 by adding 1.00 mL of QC check sample concentrate to each of four 1-L aliquots of reagent water.

8.2.3 Analyze the well-mixed QC check samples according to the method beginning in Section 10.

8.2.4 Calculate the average recovery ($\bar{X}$) in μg/mL; and the standard deviation of the recovery (s) in μg/mL, for each parameter using the four results.

8.2.5 For each parameter compare s and $\bar{X}$ with the corresponding acceptance criteria for precision and accuracy, respectively, found in Table 3. If s and $\bar{X}$ for all parameters of interest meet the acceptance criteria, the system performance is acceptable and analysis of actual samples can begin. If any individual s exceeds the precision limit or any individual $\bar{X}$ falls outside the range for accuracy, the system performance is unacceptable for that parameter.

NOTE: The large number of parameters in Table 3 present a substantial probability that one or more will fail at least one of the acceptance criteria when all parameters are analyzed.

8.2.6 When one or more of the parameters tested fail at least one of the acceptance criteria, the analyst must proceed according to Section 8.2.6.1 or 8.2.6.2.

8.2.6.1 Locate and correct the source of the problem and repeat the test for all parameters of interest beginning with Section 8.2.2.

8.2.6.2 Beginning with Section 8.2.2, repeat the test only for those parameters that failed to meet criteria. Repeated failure, however, will confirm a general problem with the measurement system. If this occurs, locate and correct the source of the problem and repeat the test for all compmunds of interest beginning with Section 8.2.2.

8.3 The laboratory must, on an ongoing basis, spike at least 10% of the samples from each sample site being monitored to assess accuracy. For laboratories analyzing one to ten samples per month, at least one spiked sample per month is required.

8.3.1 The concentration of the spike in the sample should be determined as follows:

8.3.1.1 If, as in compliance monitoring, the concentration of a specific parameter in the sample is being checked against a regulatory concentration limit, the spike should be at that limit or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.2 If the concentration of a specific parameter in the sample is not being checked against a limit specific to that parameter, the spike should be at the test concentration in Section 8.2.2 or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.3 If it is impractical to determine background levels before spiking (e.g., maximum holding times will be exceeded), the spike concentration should be (1) the regulatory concentration limit, if any; or, if none (2) the larger of either 5 times higher than the expected background concentration or the test concentration in Section 8.2.2.

8.3.2 Analyze one sample aliquot to determine the background concentration (B) of each parameter. If necessary, prepare a new QC check sample concentrate (Section 8.2.1) appropriate for the background concentrations in the sample. Spike a second sample aliquot with 1.0 mL of the QC check sample concentrate and analyze it to determine the concentration after spiking (A) of each parameter. Calculate each percent recovery (P) as 100(A-B)%/T, where T is the known true value of the spike.

8.3.3 Compare the percent recovery (P) for each parameter with the corresponding

QC acceptance criteria found in Table 3. These acceptance criteria were calculated to include an allowance for error in measurement of both the background and spike concentrations, assuming a spike to background ratio of 5:1. This error will be accounted for to the extent that the analyst's spike to background ratio approaches 5:1.[10] If spiking was performed at a concentration lower than the test concentration in Section 8.2.2, the analyst must use either the QC acceptance criteria in Table 3, or optional QC acceptance criteria calculated for the specific spike concentration. To calculate optional acceptance criteria for the recovery of a parameter: (1) Calculate accuracy (X') using the equation in Table 4, substituting the spike concentration (T) for C; (2) calculate overall precision (S') using the equation in Table 4, substituting X' for $\bar{X}$; (3) calculate the range for recovery at the spike concentration as $(100\ X'/T) \pm 2.44(100\ S'/T)\%$.[10]

8.3.4 If any individual P falls outside the designated range for recovery, that parameter has failed the acceptance criteria. A check standard containing each parameter that failed the criteria must be analyzed as described in Section 8.4.

8.4 If any parameter fails the acceptance criteria for recovery in Section 8.3, a QC check standard containing each parameter that failed must be prepared and analyzed.

NOTE: The frequency for the required analysis of a QC check standard will depend upon the number of parameters being simultaneously tested, the complexity of the sample matrix, and the performance of the laboratory. If the entire list of parameters in Table 3 must be measured in the sample in Section 8.3, the probability that the analysis of a QC check standard will be required is high. In this case the QC check standard should be routinely analyzed with the spike sample.

8.4.1 Prepare the QC check standard by adding 1.0 mL of QC check sample concentrate (Section 8.2.1 or 8.3.2) to 1 L of reagent water. The QC check standard needs only to contain the parameters that failed criteria in the test in Section 8.3.

8.4.2 Analyze the QC check standards to determine the concentration measured (A) of each parameter. Calculate each percent recovery (P_s) as 100 (A/T)%, where T is the true value of the standard concentration.

8.4.3 Compare the percent recovery (P_s) for each parameter with the corresponding QC acceptance criteria found in Table 3. Only parameters that failed the test in Section 8.3 need to be compared with these criteria. If the recovery of any such parameter falls outside the designated range, the laboratory performance for that parameter is judged to be out of control, and the problem must be immediately identified and corrected. The analytical result for that parameter in the unspiked sample is suspect and may not be reported for regulatory compliance purposes.

8.5 As part of the QC program for the laboratory, method accuracy for wastewater samples must be assessed and records must be maintained. After the analysis of five spiked wastewater samples as in Section 8.3, calculate the average percent recovery ($\bar{P}$) and the standard deviation of the percent recovery (s_p). Express the accuracy assessment as a percent recovery interval from $\bar{P} - 2\,s_p$ to $\bar{P} + 2\,s_p$. If $\bar{P} = 90\%$ and $s_p = 10\%$, for example, the accuracy interval is expressed as 70–110%. Update the accuracy assessment for each parameter on a regular basis (e.g. after each five to ten new accuracy measurements).

8.6 It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Field duplicates may be analyzed to assess the precision of the environmental measurements. When doubt exists over the identification of a peak on the chromatogram, confirmatory techniques such as gas chromatography with a dissimilar column, specific element detector, or mass spectrometer must be used. Whenever possible, the laboratory should analyze standard reference materials and participate in relevant performance evaluation studies.

9. Sample Collection, Preservation, and Handling

9.1 Grab samples must be collected in glass containers. Conventional sampling practices[11] should be followed, except that the bottle must not be prerinsed with sample before collection. Composite samples should be collected in refrigerated glass containers in accordance with the requirements of the program. Automatic sampling equipment must be as free as possible of Tygon tubing and other potential sources of contamination.

9.2 All samples must be iced or refrigerated at 4 °C from the time of collection until extraction. If the samples will not be extracted within 72 h of collection, the sample should be adjusted to a pH range of 5.0 to 9.0 with sodium hydroxide solution or sulfuric acid. Record the volume of acid or base used. If aldrin is to be determined, add sodium thiosulfate when residual chlorine is present. EPA Methods 330.4 and 330.5 may be used for measurement of residual chlorine.[12] Field test kits are available for this purpose.

9.3 All samples must be extracted within 7 days of collection and completely analyzed within 40 days of extraction.[2]

10. Sample Extraction

10.1 Mark the water meniscus on the side of the sample bottle for later determination of sample volume. Pour the entire sample into a 2-L separatory funnel.

10.2 Add 60 mL of methylene chloride to the sample bottle, seal, and shake 30 s to rinse the inner surface. Transfer the solvent to the separatory funnel and extract the sample by shaking the funnel for 2 min. with periodic venting to release excess pressure. Allow the organic layer to separate from the water phase for a minimum of 10 min. If the emulsion interface between layers is more than one-third the volume of the solvent layer, the analyst must employ mechanical techniques to complete the phase separation. The optium technique depends upon the sample, but may include stirring, filtration of the emulsion through glass wool, centrifugation, or other physical methods. Collect the methylene chloride extract in a 250-mL Erlenmeyer flask.

10.3 Add a second 60-mL volume of methylene chloride to the sample bottle and repeat the extraction procedure a second time, combining the extracts in the Erlenmeyer flask. Perform a third extraction in the same manner.

10.4 Assemble a Kuderna-Danish (K-D) concentrator by attaching a 10-mL concentrator tube to a 500-mL evaporative flask. Other concentration devices or techniques may be used in place of the K-D concentrator if the requirements of Section 8.2 are met.

10.5 Pour the combined extract through a solvent-rinsed drying column containing about 10 cm of anhydrous sodium sulfate, and collect the extract in the K-D concentrator. Rinse the Erlenmeyer flask and column with 20 to 30 mL of methylene chloride to complete the quantitative transfer.

10.6 Add one or two clean boiling chips to the evaporative flask and attach a three-ball Snyder column. Prewet the Snyder column by adding about 1 mL of methylene chloride to the top. Place the K-D apparatus on a hot water bath (60 to 65 °C) so that the concentrator tube is partially immersed in the hot water, and the entire lower rounded surface of the flask is bathed with hot vapor. Adjust the vertical position of the apparatus and the water temperature as required to complete the concentration in 15 to 20 min. At the proper rate of distillation the balls of the column will actively chatter but the chambers will not flood with condensed solvent. When the apparent volume of liquid reaches 1 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 min.

10.7 Increase the temperature of the hot water bath to about 80 °C. Momeltarily remove the Snyder column, add 50 mL of hexane and a new boiling chip, and reattach the Snyder column. Concentrate the extract as in Section 10.6, except use hexane to prewet the column. The elapsed time of concentration should be 5 to 10 min.

10.8 Remove the Snyder column and rinse the flask and its lower joint into the concentrator tube with 1 to 2 mL of hexane. A 5-mL syringe is recommended for this operation. Stopper the concentrator tube and store refrigerated if further processing will not be performed immediately. If the extract will be stored longer than two days, it should be transferred to a Teflon-sealed screw-cap vial. If the sample extract requires no further cleanup, proceed with gas chromatographic analysis (Section 12). If the sample requires further cleanup, proceed to Section 11.

10.9 Determine the original sample volume by refilling the sample bottle to the mark and transferring the liquid to a 1000-mL graduated cylinder. Record the sample volume to the nearest 5 mL.

11. Cleanup and Separation

11.1 Cleanup procedures may not be necessary for a relatively clean sample matrix. If particular circumstances demand the use of a cleanup procedure, the analyst may use either procedure below or any other appropriate procedure. However, the analyst first must demonstrate that the requirements of Section 8.2 can be met using the method as revised to incorporate the cleanup procedure. The Florisil column allows for a select fractionation of the compounds and will eliminate polar interferences. Elemental sulfur, which interferes with the electron capture gas chromatography of certain pesticides, can be removed by the technique described in Section 11.3.

11.2 Florisil column cleanup:

11.2.1 Place a weight of Florisil (nominally 20 g) predetermined by calibration (Section 7.5), into a chromatographic column. Tap the column to settle the Florisil and add 1 to 2 cm of anhydrous sodium sulfate to the top.

11.2.2 Add 60 mL of hexane to wet and rinse the sodium sulfate and Florisil. Just prior to exposure of the sodium sulfate layer to the air, stop the elution of the hexane by closing the stopcock on the chromatographic column. Discard the eluate.

11.2.3 Adjust the sample extract volume to 10 mL with hexane and transfer it from the K-D concentrator tube onto the column. Rinse the tube twice with 1 to 2 mL of hexane, adding each rinse to the column.

11.2.4 Place a 500-mL K-D flask and clean concentrator tube under the chromatographic column. Drain the column into the flask until the sodium sulfate layer is nearly exposed. Elute the column with 200 mL of 6% ethyl ether in hexane (V/V) (Fraction 1) at a rate of about 5 mL/min.

Remove the K-D flask and set it aside for later concentration. Elute the column again, using 200 mL of 15% ethyl ether in hexane (V/V) (Fraction 2), into a second K-D flask. Perform the third elution using 200 mL of 50% ethyl ether in hexane (V/V) (Fraction 3). The elution patterns for the pesticides and PCBs are shown in Table 2.

11.2.5 Concentrate the fractions as in Section 10.6, except use hexane to prewet the column and set the water bath at about 85 °C. When the apparatus is cool, remove the Snyder column and rinse the flask and its lower joint into the concentrator tube with hexane. Adjust the volume of each fraction to 10 mL with hexane and analyze by gas chromatography (Section 12).

11.3 Elemental sulfur will usually elute entirely in Fraction 1 of the Florisil column cleanup. To remove sulfur interference from this fraction or the original extract, pipet 1.00 mL of the concentrated extract into a clean concentrator tube or Teflon-sealed vial. Add one to three drops of mercury and seal.[13] Agitate the contents of the vial for 15 to 30 s. Prolonged shaking (2 h) may be required. If so, this may be accomplished with a reciprocal shaker. Alternatively, activated copper powder may be used for sulfur removal.[14] Analyze by gas chromatography.

12. Gas Chromatography

12.1 Table 1 summarizes the recommended operating conditions for the gas chromatograph. Included in this table are retention times and MDL that can be achieved under these conditions. Examples of the separations achieved by Column 1 are shown in Figures 1 to 10. Other packed or capillary (open-tubular) columns, chromatographic conditions, or detectors may be used if the requirements of Section 8.2 are met.

12.2 Calibrate the system daily as described in Section 7.

12.3 If the internal standard calibration procedure is being used, the internal standard must be added to the sample extract and mixed thoroughly immediately before injection into the gas chromatograph.

12.4 Inject 2 to 5 μL of the sample extract or standard into the gas chromatograph using the solvent-flush technique.[15] Smaller (1.0 uL) volumes may be injected if automatic devices are employed. Record the volume injected to the nearest 0.05 μL, the total extract volume, and the resulting peak size in area or peak height units.

12.5 Identify the parameters in the sample by comparing the retention times of the peaks in the sample chromatogram with those of the peaks in standard chromatograms. The width of the retention time window used to make identifications should be based upon measurements of actual retention time variations of standards over the course of a day. Three times the standard deviation of a retention time for a compound can be used to calculate a suggested window size; however, the experience of the analyst should weigh heavily in the interpretation of chromatograms.

12.6 If the response for a peak exceeds the working range of the system, dilute the extract and reanalyze.

12.7 If the measurement of the peak response is prevented by the presence of interferences, further cleanup is required.

13. Calculations

13.1 Determine the concentration of individual compounds in the sample.

13.1.1 If the external standard calibration procedure is used, calculate the amount of material injected from the peak response using the calibration curve or calibration factor determined in Section 7.2.2. The concentration in the sample can be calculated from Equation 2.

$$\text{Concentration } (\mu g/L) = \frac{(A)(V_t)}{(V_i)(V_s)}$$

Equation 2

where:

A = Amount of material injected (ng).

V_i = Volume of extract injected (μL).

V_t = Volume of total extract (μL).

V_s = Volume of water extracted (mL).

13.1.2 If the internal standard calibration procedure is used, calculate the concentration in the sample using the response factor (RF) determined in Section 7.3.2 and Equation 3.

$$\text{Concentration } (\mu g/L) = \frac{(A_s)(I_s)}{(A_{is})(RF)(V_o)}$$

Equation 3

where:

A_s=Response for the parameter to be measured.

A_{is}=Response for the internal standard.

I_s=Amount of internal standard added to each extract (μg).

V_o=Volume of water extracted (L).

13.2 When it is apparent that two or more PCB (Aroclor) mixtures are present, the Webb and McCall procedure[16] may be used to identify and quantify the Aroclors.

13.3 For multicomponent mixtures (chlordane, toxaphene, and PCBs) match retention times of peaks in the standards with peaks in the sample. Quantitate every identifiable peak unless interference with individual peaks persist after cleanup. Add peak height or peak area of each identified peak in the chromatogram. Calculate as total response in the sample versus total response in the standard.

13.4 Report results in μg/L without correction for recovery data. All QC data obtained should be reported with the sample results.

14. Method Performance

14.1 The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero.[1] The MDL concentrations listed in Table 1 were obtained using reagent water.[17] Similar results were achieved using representative wastewaters. The MDL actually achieved in a given analysis will vary depending on instrument sensitivity and matrix effects.

14.2 This method has been tested for linearity of spike recovery from reagent water and has been demonstrated to be applicable over the concentration range from 4×MDL to 1000×MDL with the following exceptions: Chlordane recovery at 4×MDL was low (60%); Toxaphene recovery was demonstrated linear over the range of 10×MDL to 1000×MDL.[17]

14.3 This method was tested by 20 laboratories using reagent water, drinking water, surface water, and three industrial wastewaters spiked at six concentrations.[14] Concentrations used in the study ranged from 0.5 to 30 μg/L for single-component pesticides and from 8.5 to 400 μg/L for multicomponent parameters. Single operator precision, overall precision, and method accuracy were found to be directly related to the concentration of the parameter and essentially independent of the sample matrix. Linear equations to describe these relationships are presented in Table 4.

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TABLE 1.—CHROMATOGRAPHIC CONDITIONS AND METHOD DETECTION LIMITS

Parameter	Retention time (min)		Method detection limit (μg/L)
	Col. 1	Col. 2	
α-BHC	1.35	1.82	0.003
γ-BHC	1.70	2.13	0.004
β-BHC	1.90	1.97	0.006
Heptachlor	2.00	3.35	0.003
δ-BHC	2.15	2.20	0.009
Aldrin	2.40	4.10	0.004
Heptachlor epoxide	3.50	5.00	0.083
Endosulfan I	4.50	6.20	0.014
4,4′-DDE	5.13	7.15	0.004
Dieldrin	5.45	7.23	0.002
Endrin	6.55	8.10	0.006
4,4′-DDD	7.83	9.08	0.011
Endosulfan II	8.00	8.28	0.004
4,4′-DDT	9.40	11.75	0.012
Endrin aldehyde	11.82	9.30	0.023
Endosulfan sulfate	14.22	10.70	0.066
Chlordane	mr	mr	0.014
Toxaphene	mr	mr	0.24
PCB–1016	mr	mr	nd
PCB–1221	mr	mr	nd
PCB–1232	mt	mr	nd
PCB–1242	mr	mr	0.065
PCB–1248	mr	mr	nd
PCB–1254	mr	mr	nd
PCB–1260	mr	mr	nd

Column 1 conditions: Supelcoport (100/120 mesh) coated with 1.5% SP-2250/1.95% SP-2401 packed in a 1.8 m long × 4 mm ID glass column with 5% methane/95% argon carrier gas at 60 mL/min flow rate. Column temperature held isothermal at 200 °C, except for PCB–1016 through PCB–1248, should be measured at 160 °C.

Column 2 conditions: Supelcoport (100/120 mesh) coated with 3% OV-1 packed in a 1.8 m long × 4 mm ID glass column with 5% methane/95% argon carrier gas at 60 mL/min flow rate. Column temperature held isothermal at 200 °C for the pesticides; at 140 °C for PCB–1221 and 1232; and at 170 °C for PCB–1016 and 1242 to 1268.

mr=Multiple peak response. See Figures 2 thru 10.
nd=Not determined.

TABLE 2.—DISTRIBUTION OF CHLORINATED PESTICIDES AND PCBS INTO FLORISIL COLUMN FRACTIONS [2]

Parameter	Percent recovery by fraction[a]		
	1	2	3
Aldrin	100		
α-BHC	100		
β-BHC	97		
δ-BHC	98		
γ-BHC	100		
Chlordane	100		
4,4′-DDD	99		
4,4′-DDE	98		
4,4′-DDT	100		
Dieldrin	0	100	
Endosulfan I	37	64	
Endosulfan II	0	7	91
Endosulfan sulfate	0	0	106
Endrin	4	96	
Endrin aldehyde	0	68	26
Heptachlor	100		
Heptachlor epoxide	100		
Toxaphene	96		
PCB–1016	97		
PCB–1221	97		
PCB–1232	95	4	
PCB–1242	97		
PCB–1248	103		
PCB–1254	90		
PCB–1260	95		

[a] Eluant composition:
Fraction 1–6% ethyl ether in hexane.
Fraction 2–15% ethyl ether in hexane.
Fraction 3–50% ethyl ether in hexane.

TABLE 3.—QC ACCEPTANCE CRITERIA—METHOD 608

Parameter	Test conc. (μg/L)	Limit for s (μg/L)	Range for $\bar{X}$ (μg/L)	Range for P, P_s(%)
Aldrin	2.0	0.42	1.08–2.24	42-122
α-BHC	2.0	0.48	0.98–2.44	37-134
β-BHC	2.0	0.64	0.78–2.60	17-147
δ-BHC	2.0	0.72	1.01–2.37	19-140
γ-BHC	2.0	0.46	0.86–2.32	32-127
Chlordane	50	10.0	27.6–54.3	45-119
4,4′-DDD	10	2.8	4.8–12.6	31-141
4,4′-DDE	2.0	0.55	1.08–2.60	30-145
4,4′-DDT	10	3.6	4.6–13.7	25-160
Dieldrin	2.0	0.76	1.15–2.49	36-146
Endosulfan I	2.0	0.49	1.14–2.82	45-153
Endosulfan II	10	6.1	2.2–17.1	D-202
Endosulfan Sulfate	10	2.7	3.8–13.2	26-144
Endrin	10	3.7	5.1–12.6	30-147
Heptachlor	2.0	0.40	0.86–2.00	34-111
Heptachlor epoxide	2.0	0.41	1.13–2.63	37-142
Toxaphene	50	12.7	27.8–55.6	41-126
PCB-1016	50	10.0	30.5–51.5	50-114
PCB-1221	50	24.4	22.1–75.2	15-178
PCB-1232	50	17.9	14.0–98.5	10-215
PCB-1242	50	12.2	24.8–69.8	39-150
PCB-1248	50	15.9	29.0–70.2	38-158
PCB-1254	50	13.8	22.2–57.9	29-131
PCB-1260	50	10.4	18.7–54.9	8-127

s = Standard deviation of four recovery measurements, in μg/L (Section 8.2.4).

$\bar{X}$ = Average recovery for four recovery measurements, in μg/L (Section 8.2.4).

P, P_s = Percent recovery measured (Section 8.3.2, Section 8.4.2).

D = Detected; result must be greater than zero.

NOTE: These criteria are based directly upon the method performance data in Table 4. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table 4.

TABLE 4. METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION—METHOD 608

Parameter	Accuracy, as recovery, X' (μg/L)	Single analyst precision, s_r' (μg/L)	Overall precision, S' (μg/L)
Aldrin	0.81C + 0.04	$0.16\bar{X} - 0.04$	$0.20\bar{X} - 0.01$
α-BHC	0.84C + 0.03	$0.13\bar{X} + 0.04$	$0.23\bar{X} - 0.00$
β-BHC	0.81C + 0.07	$0.22\bar{X} - 0.02$	$0.33\bar{X} - 0.05$
δ-BHC	0.81C + 0.07	$0.18\bar{X} + 0.09$	$0.25\bar{X} + 0.03$
γ-BHC	0.82C − 0.05	$0.12\bar{X} + 0.06$	$0.22\bar{X} + 0.04$
Chlordane	0.82C − 0.04	$0.13\bar{X} + 0.13$	$0.18\bar{X} + 0.18$
4,4′-DDD	0.84C + 0.30	$0.20\bar{X} - 0.18$	$0.27\bar{X} - 0.14$
4,4′-DDE	0.85C + 0.14	$0.13\bar{X} + 0.06$	$0.28\bar{X} - 0.09$
4,4′-DDT	0.93C − 0.13	$0.17\bar{X} + 0.39$	$0.31\bar{X} - 0.21$
Dieldrin	0.90C + 0.02	$0.12\bar{X} + 0.19$	$0.16\bar{X} + 0.16$
Endosulfan I	0.97C + 0.04	$0.10\bar{X} + 0.07$	$0.18\bar{X} + 0.08$

TABLE 4. METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION—METHOD 608—Continued

Parameter	Accuracy, as recovery, X' (μg/L)	Single analyst precision, s_r' (μg/L)	Overall precision, S' (μg/L)
Endosulfan II	0.93C + 0.34	$0.41\bar{X}—0.65$	$0.47\bar{X} - 0.20$
Endosulfan Sulfate	0.89C − 0.37	$0.13\bar{X} + 0.33$	$0.24\bar{X} + 0.35$
Endrin	0.89C − 0.04	$0.20\bar{X} + 0.25$	$0.24\bar{X} + 0.25$
Heptachlor	0.69C + 0.04	$0.06\bar{X} + 0.13$	$0.16\bar{X} + 0.08$
Heptachlor epoxide	0.89C + 0.10	$0.18\bar{X} - 0.11$	$0.25\bar{X} - 0.08$
Toxaphene	0.80C + 1.74	$0.09\bar{X} + 3.20$	$0.20\bar{X} + 0.22$
PCB-1016	0.81C + 0.50	$0.13\bar{X} + 0.15$	$0.15\bar{X} + 0.45$
PCB-1221	0.96C + 0.65	$0.29\bar{X} - 0.76$	$0.35\bar{X} - 0.62$
PCB-1232	0.91C + 10.79	$0.21\bar{X} - 1.93$	$0.31\bar{X} + 3.50$
PCB-1242	0.93C + 0.70	$0.11\bar{X} + 1.40$	$0.21\bar{X} + 1.52$
PCB-1248	0.97C + 1.06	$0.17\bar{X} + 0.41$	$0.25\bar{X} - 0.37$
PCB-1254	0.76C + 2.07	$0.15\bar{X} + 1.66$	$0.17\bar{X} + 3.62$
PCB-1260	0.66C + 3.76	$0.22\bar{X} - 2.37$	$0.39\bar{X} - 4.86$

X' = Expected recovery for one or more measurements of a sample containing a concentration of C, in μg/L.

s_r' = Expected single analyst standard deviation of measurements at an average concentration found of $\bar{X}$, in μg/L.

S' = Expected interlaboratory standard deviation of measurements at an average concentration found of $\bar{X}$, in μg/L.

C = True value for the concentration, in μg/L.

$\bar{X}$ = Average recovery found for measurements of samples containing a concentration of C, in μg/L.

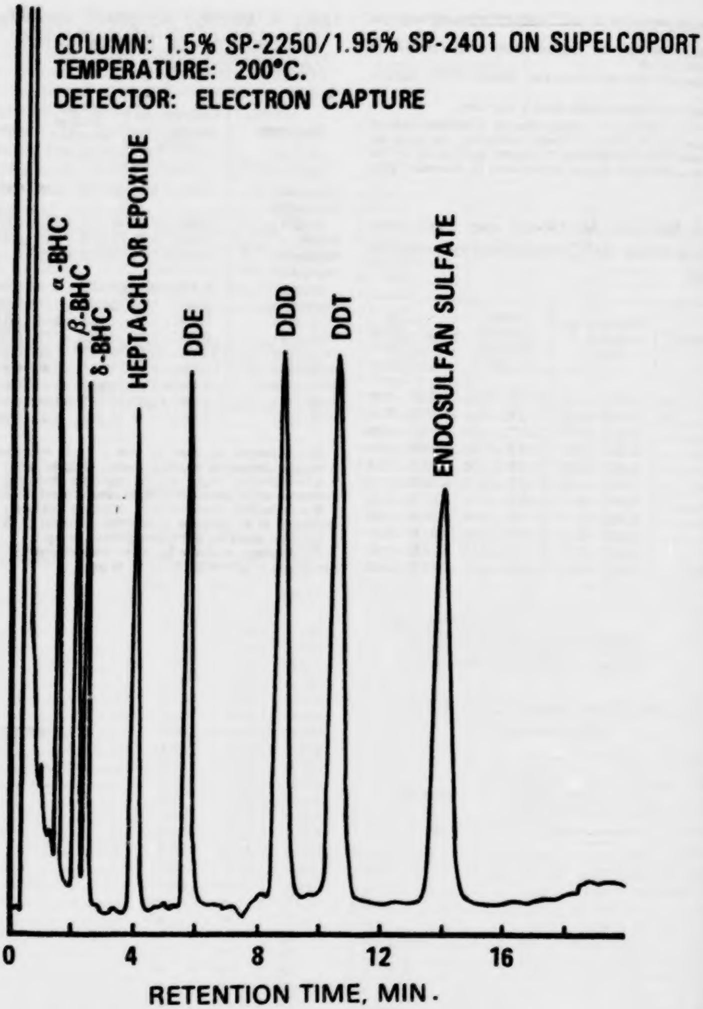


Figure 1. Gas chromatogram of pesticides.

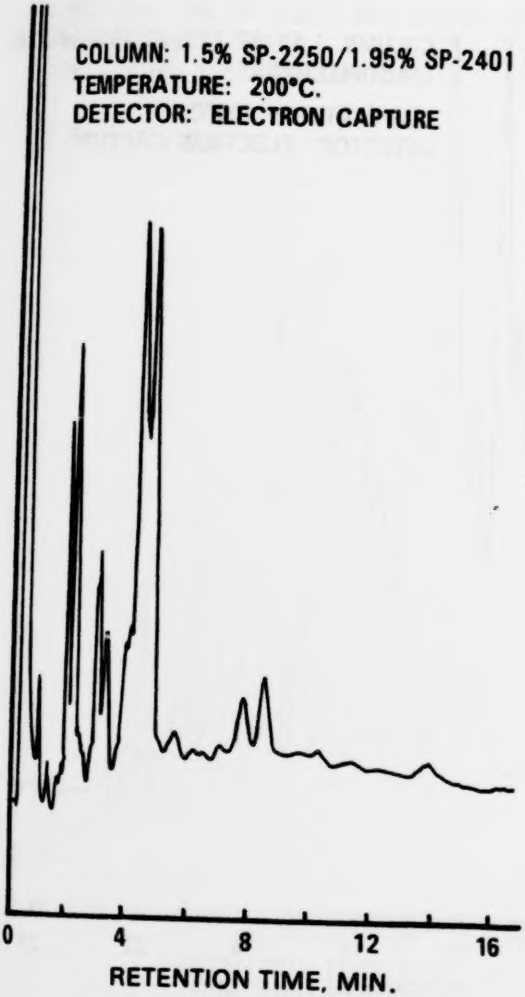


Figure 2. Gas chromatogram of chlordane.

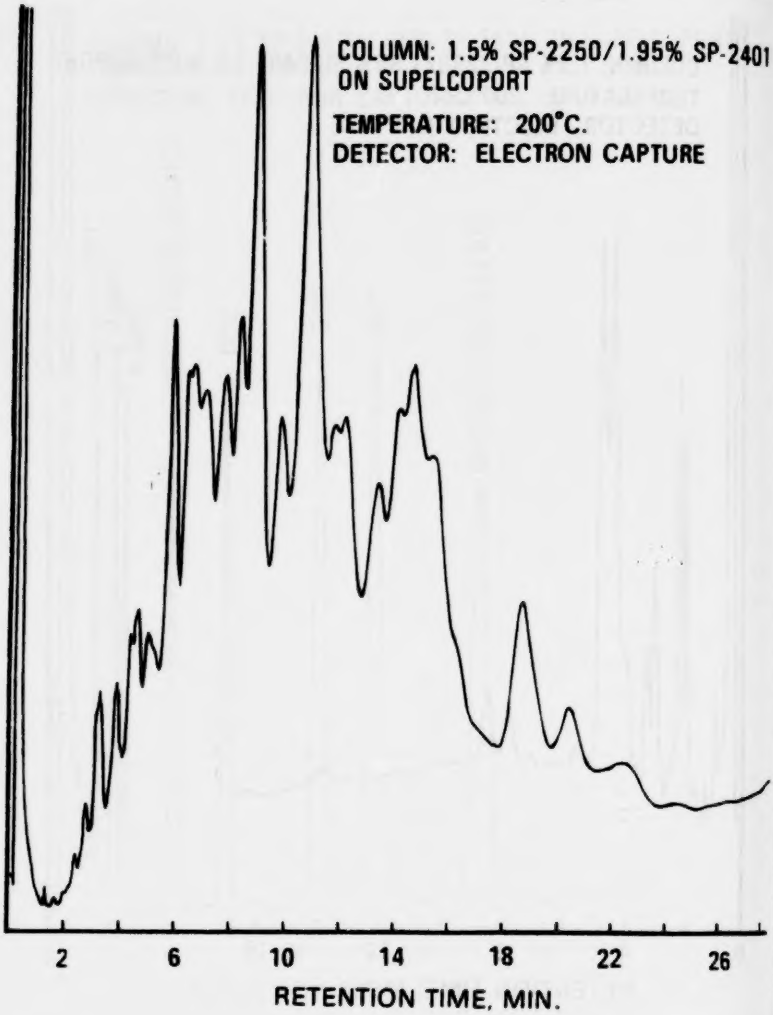


Figure 3. Gas chromatogram of toxaphene.

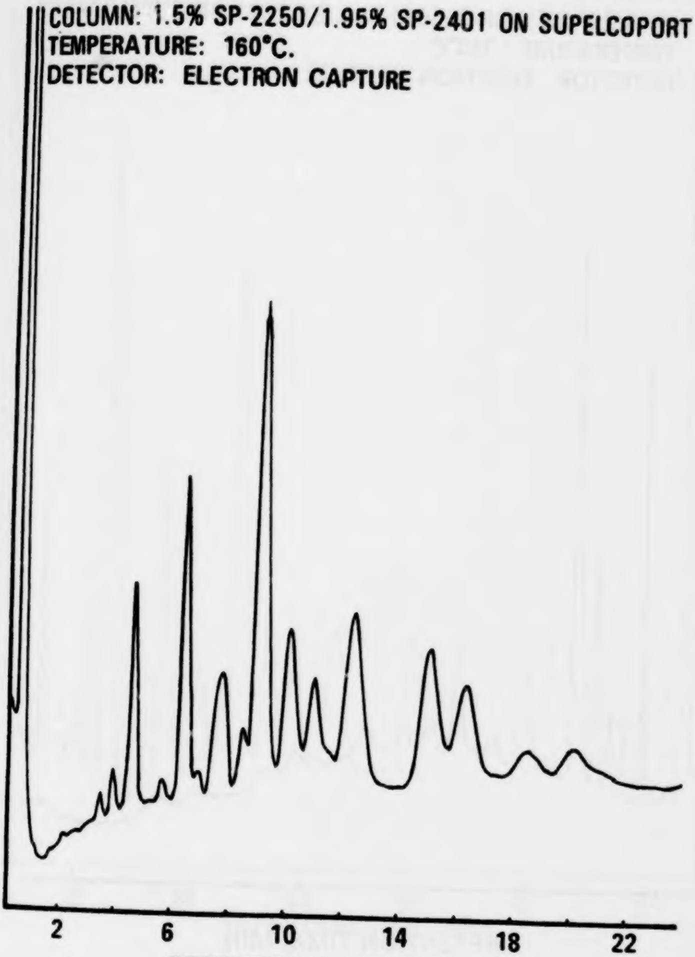


Figure 4. Gas chromatogram of PCB-1016.

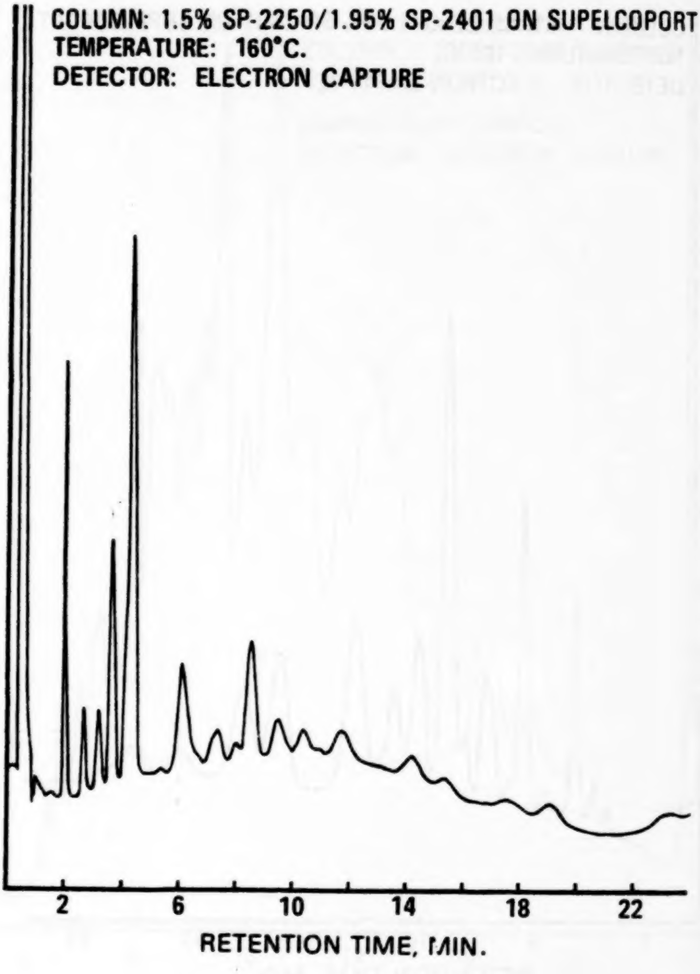


Figure 5. Gas chromatogram of PCB-1221.

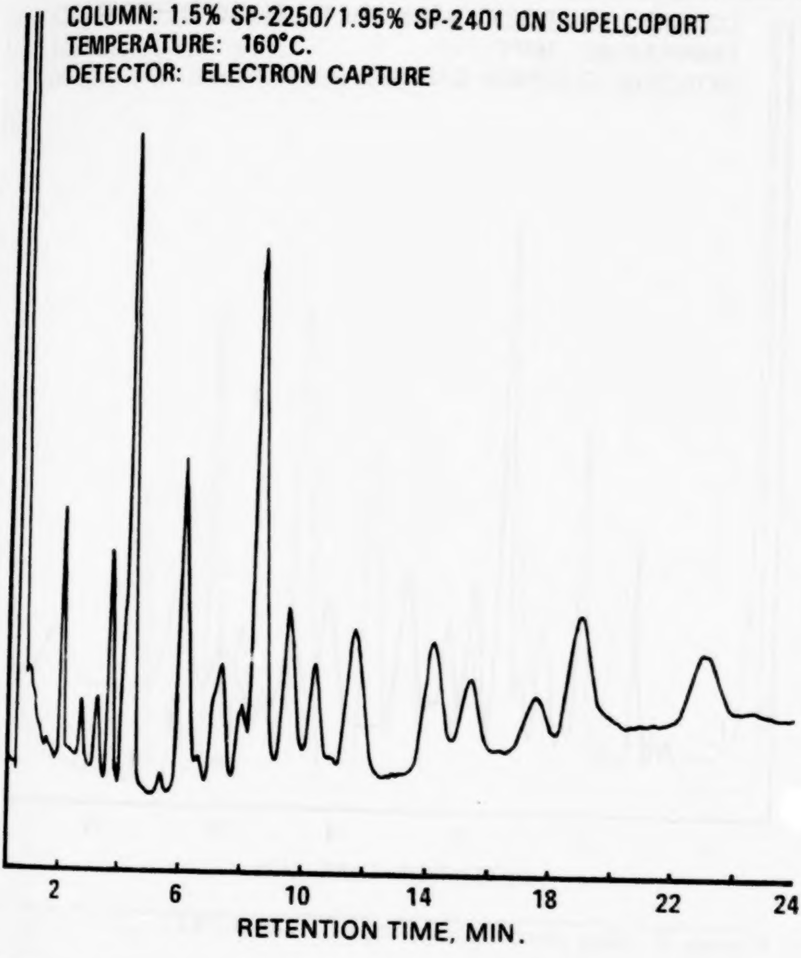


Figure 6. Gas chromatogram of PCB-1232.

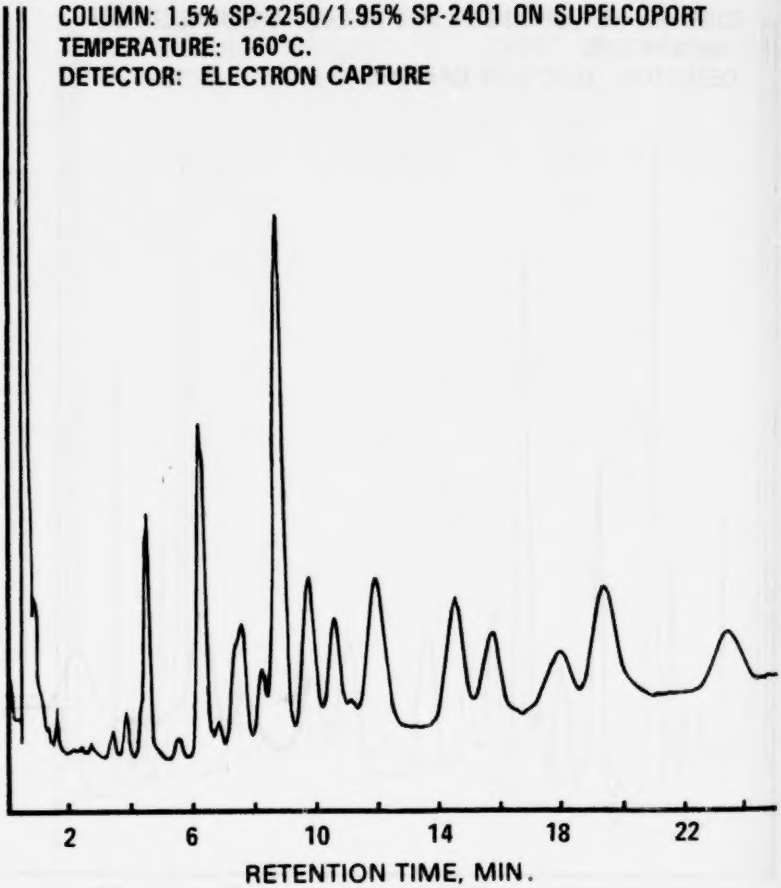


Figure 7. Gas chromatogram of PCB-1242.

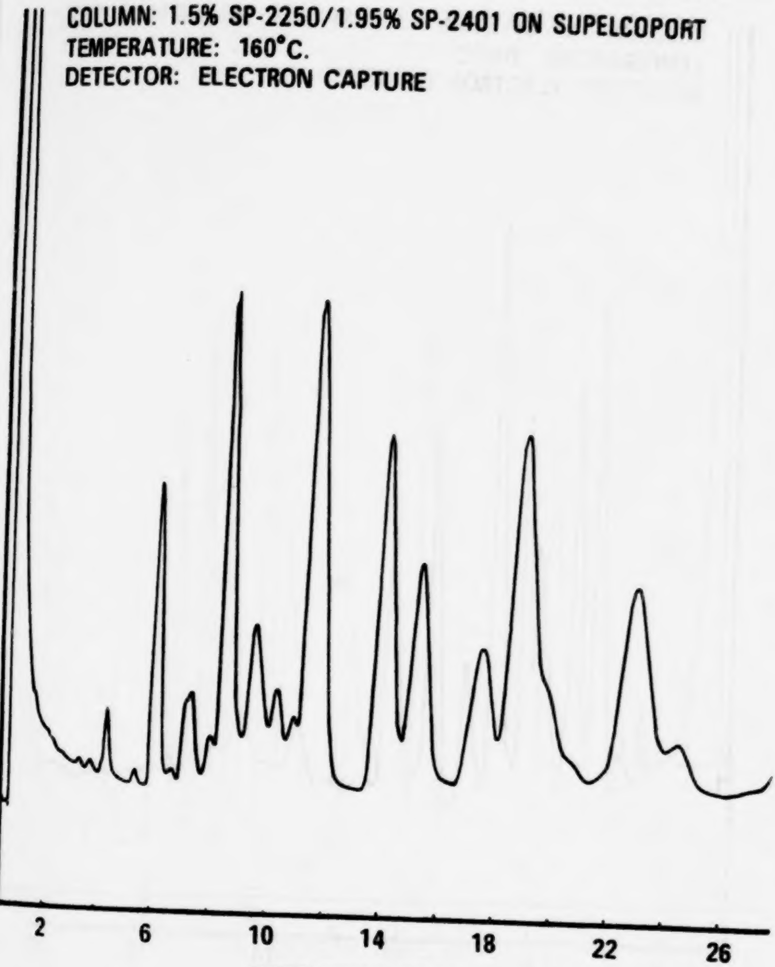


Figure 8. Gas chromatogram of PCB-1248.

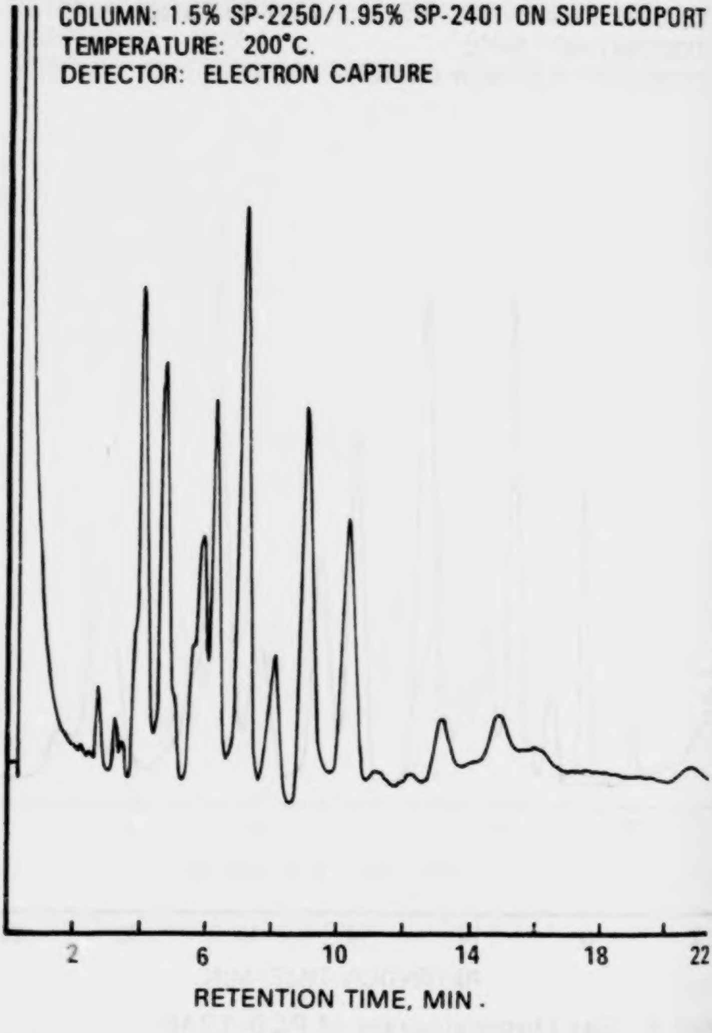
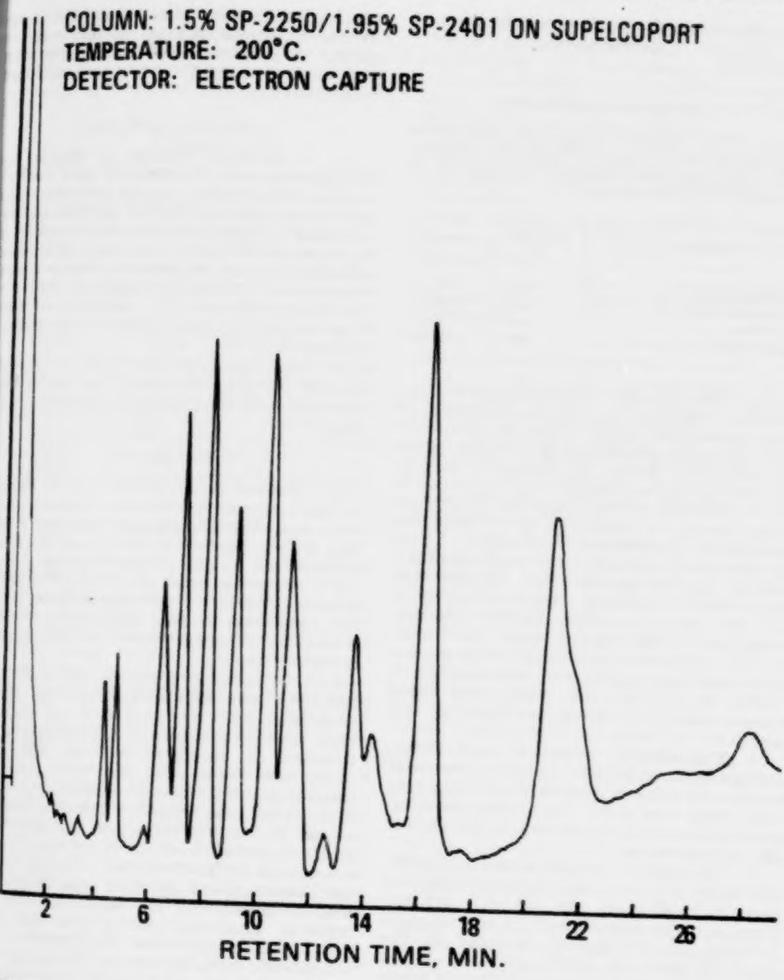


Figure 9. Gas chromatogram of PCB-1254.



igure 10. Gas chromatogram of PCB-1260.

METHOD 609—NITROAROMATICS AND ISOPHORONE

1. Scope and Application

1.1 This method covers the determination of certain nitroaromatics and isophorone. The following parameters may be determined by this method:

Parameter	STORET No.	CAS No.
2,4-Dinitrotoluene	34611	121-14-2
2,6-Dinitrotoluene	34626	606-20-2
Isophorone	34408	78-59-1
Nitrobenzene	34447	98-95-3

1.2 This is a gas chromatographic (GC) method applicable to the determination of the compounds listed above in municipal and industrial discharges as provided under 40 CFR 136.1. When this method is used to analyze unfamiliar samples for any or all of the compounds above, compound identifications should be supported by at least one additional qualitative technique. This method describes analytical conditions for a second gas chromatographic column that can be used to confirm measurements made with the primary column. Method 625 provides gas chromatograph/mass spectrometer (GC/MS) conditions appropriate for the qualitative and quantitative confirmation of results for all of the parameters listed above, using the extract produced by this method.

1.3 The method detection limit (MDL, defined in Section 14.1)[1] for each parameter is listed in Table 1. The MDL for a specific wastewater may differ from those listed, depending upon the nature of interferences in the sample matrix.

1.4 The sample extraction and concentration steps in this method are essentially the same as in Methods 606, 608, 611, and 612. Thus, a single sample may be extracted to measure the parameters included in the scope of each of these methods. When cleanup is required, the concentration levels must be high enough to permit selecting aliquots, as necessary, to apply appropriate cleanup procedures. The analyst is allowed the latitude, under Section 12, to select chromatographic conditions appropriate for the simultaneous measurement of combinations of these parameters.

1.5 Any modification of this method, beyond those expressly permitted, shall be considered as a major modification subject to application and approval of alternate test procedures under 40 CFR 136.4 and 136.5.

1.6 This method is restricted to use by or under the supervision of analysts experienced in the use of a gas chromatograph and in the interpretation of gas chromatograms. Each analyst must demonstrate th ability to generate acceptable results wi this method using the procedure describe in Section 8.2.

2. Summary of Method

2.1 A measured volume of sample, a proximately 1-L, is extracted with methylene chloride using a separatory funnel. Th methylene chloride extract is dried and e changed to hexane during concentration a volume of 10 mL or less. Isophorone a nitrobenzene are measured by flame ioniza tion detector gas chromatography (FIDGC The dinitrotoluenes are measured by ele tron capture detector gas chromatograph (ECDGC).[2]

2.2 The method provides a Flori column cleanup procedure to aid in t elimination of interferences that may be e countered.

3. Interferences

3.1 Method interferences may be cau by contaminants in solvents, reagents, gla ware, and other sample processing hardwa that lead to discrete artifacts and/or elev ed baseliles in gas chromatograms. All these materials must be routinely demo strated to be free from interferences und the conditions of the analysis by runn laboratory reagent blanks as described Section 8.1.3.

3.1.1 Glassware must be scrupulou cleaned.[3] Clean all glassware as soon as p sible after use by rinsing with the last s vent used in it. Solvent rinsing should followed by detergent washing with h water, and rinses with tap water and d tilled water. The glassware should then drained dry, and heated in a muffle furna at 400 °C for 15 to 30 min. Some therma stable materials, such as PCBs, may not eliminated by this treatment. Solvent rin with acetone and pesticide quality hex may be substituted for the muffle furna heating. Thorough rinsing with such s vents usually eliminates PCB interferen Volumetric ware should not be heated in muffle furnace. After drying and cooli glassware should be sealed and stored in clean environment to prevent any accumu tion of dust or other contaminants. Store verted or capped with aluminum foil.

3.1.2 The use of high purity reagents a solvents helps to minimize interfere problems. Purification of solvents by dis lation in all-glass systems may be requi

3.2 Matrix interferences may be cau by contaminants that are co-extracted fr the sample. The extent of matrix interf ences will vary considerably from source source, depending upon the nature and versity of the industrial complex or mu pality being sampled. The cleanup procedure in Section 11 can be used to overcome many of these interferences, but unique samples may require additional cleanup approaches to achieve the MDL listed in Table 1.

4. Safety

4.1 The toxicity or carcinogenicity of each reagent used in this method has not been precisely defined; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material data handling sheets should also be made available to all personnel involved in the chemical analysis. Additional references to laboratory safety are available and have been identified [4-6] for the information of the analyst.

5. Apparatus and Materials

5.1 Sampling equipment, for discrete or composite sampling.

5.1.1 Grab sample bottle—1-L or 1-qt, amber glass, fitted with a screw cap lined vith Teflon. Foil may be substituted for Teflon if the sample is not corrosive. If amber bottles are not available, protect samples from light. The bottle and cap liner nust be washed, rinsed with acetone or nethylene chloride, and dried before use to ninimize contamination.

5.1.2 Automatic sampler (optional)—The ampler must incorporate glass sample con- ainers for the collection of a minimum of 50 mL of sample. Sample containers must e kept refrigerated at 4 °C and protected om light during compositing. If the sam- ler uses a peristaltic pump, a minimum ngth of compressible silicone rubber bing may be used. Before use, however, e compressible tubing should be thor- ghly rinsed with methanol, followed by peated rinsings with distilled water to inimize the potential for contamination of e sample. An integrating flow meter is re- ired to collect flow proportional compos- s.

.2 Glassware (All specifications are sug- sted. Catalog numbers are included for il- stration only.):

.2.1 Separatory funnel—2-L, with Teflon pcock.

.2.2 Drying column—Chromatographic umn, approximately 400 mm long x 19 n ID, with coarse frit filter disc.

.2.3 Chromatographic column—100 mm g x 10 mm ID, with Teflon stopcock.

5.2.4 Concentrator tube, Kuderna-Danish—10-mL, graduated (Kontes K-570050-1025 or equivalent). Calibration must be checked at the volumes employed in the test. Ground glass stopper is used to prevent evaporation of extracts.

5.2.5 Evaporative flask, Kuderna-Danish—500-mL (Kontes K-570001-0500 or equivalent). Attach to concentrator tube with springs.

5.2.6 Snyder column, Kuderna-Danish—Three-ball macro (Kontes K-503000-0121 or equivalent).

5.2.7 Snyder column, Kuderna-Danish—Two-ball micro (Kontes K-569001-0219 or equivalent).

5.2.8 Vials—10 to 15-mL, amber glass, with Teflon-lined screw cap.

5.3 Boiling chips—Approximately 10/40 mesh. Heat to 400 °C for 30 min or Soxhlet extract with methylene chloride.

5.4 Water bath—Heated, with concentric ring cover, capable of temperature control (± 2 °C). The bath should be used in a hood.

5.5 Balance—Analytical, capable of accurately weighing 0.0001 g.

5.6 Gas chromatograph—An analytical system complete with gas chromatograph suitable for on-column injection and all required accessories including syringes, analytical columns, gases, detector, and strip-chart recorder. A data system is recommended for measuring peak areas.

5.6.1 Column 1—1.2 m long x 2 or 4 mm ID glass, packed with 1.95% QF-1/1.5% OV-17 on Gas-Chrom Q (80/100 mesh) or equivalent. This column was used to develop the method performance statements given in Section 14. Guidelines for the use of alternate column packings are provided in Section 12.1.

5.6.2 Column 2—3.0 m long x 2 or 4 mm ID glass, packed with 3% OV-101 on Gas-Chrom Q (80/100 mesh) or equivalent.

5.6.3 Detectors—Flame ionization and electron capture detectors. The flame ionization detector (FID) is used when determining isophorone and nitrobenzene. The electron capture detector (ECD) is used when determining the dinitrotoluenes. Both detectors have proven effective in the analysis of wastewaters and were used in develop the method performance statements in Section 14. Guidelines for the use to alternate detectors are provided in Section 12.1.

6. Reagents

6.1 Reagent water—Reagent water is defined as a water in which an interferent is not observed at the MDL of the parameters of interest.

6.2 Sodium hydroxide solution (10 N)—Dissolve 40 g of NaOH (ACS) in reagent water and dilute to 100 mL.

6.3 Sulfuric acid (1+1)—Slowly, add 50 mL of H_2SO_4 (ACS, sp. gr. 1.84) to 50 mL of reagent water.

6.4 Acetone, hexane, methanol, methylene chloride—Pesticide quality or equivalent.

6.5 Sodium sulfate—(ACS) Granular, anhydrous. Purify by heating at 400 °C for 4 h in a shallow tray.

6.6 Florisil—PR grade (60/100 mesh). Purchase activated at 1250 °F and store in dark in glass containers with ground glass stoppers or foil-lined screw caps. Before use, activate each batch at least 16 h at 200 °C in a foil-covered glass container and allow to cool.

6.7 Stock standard solutions (1.00 μg/μL)—Stock standard solutions can be prepared from pure standard materials or purchased as certified solutions.

6.7.1 Prepare stock standard solutions by accurately weighing about 0.0100 g of pure material. Dissolve the material in hexane and dilute to volume in a 10-mL volumetric flask. Larger volumes can be used at the convenience of the analyst. When compound purity is assayed to be 96% or greater, the weight can be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards can be used at any concentration if they are certified by the manufacturer or by an independent source.

6.7.2 Transfer the stock standard solutions into Teflon-sealed screw-cap bottles. Store at 4 °C and protect from light. Stock standard solutions should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

6.7.3 Stock standard solutions must be replaced after six months, or sooner if comparison with check standards indicates a problem.

6.8 Quality control check sample concentrate—See Section 8.2.1.

7. Calibration

7.1 Establish gas chromatographic operating conditions equivalent to those given in Table 1. The gas chromatographic system can be calibrated using the external standard technique (Section 7.2) or the internal standard technique (Section 7.3).

7.2 External standard calibration procedure:

7.2.1 Prepare calibration standards at a minimum of three concentration levels for each parameter of interest by adding volumes of one or more stock standards to a volumetric flask and diluting to volume with hexane. One of the external standards should be at a concentration near, but above, the MDL (Table 1) and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working ra of the detector.

7.2.2 Using injections of 2 to 5 μL, a lyze each calibration standard according Section 12 and tabulate peak height or a responses against the mass injected. The r sults can be used to prepare a calibratio curve for each compound. Alternatively, the ratio of response to amount inject (calibration factor) is a constant over th working range (< 10% relative standard d viation, RSD) linearity through the orig can be assumed and the average ratio o calibration factor can be used in place of calibration curve.

7.3 Internal standard calibration proce dure—To use this approach, the analy must select one or more internal standar that are similar in analytical behavior t the compounds of interest. The analy must further demonstrate that the mea urement of the internal standard is not a fected by method or matrix interferenc Because of these limitations, no intern standard can be suggested that is applicab to all samples.

7.3.1 Prepare calibration standards at minimum of three concentration levels f each parameter of interest by adding vo umes of one or more stock standards to volumetric flash. To each calibration stan ard, add a known constant amount of one more internal standards, and dilute t volume with hexane. One of the standar should be at a concentration near, b above, the MDL and the other concentra tions should correspond to the expect range of concentrations found in real sa ples or should define the working range the detector.

7.3.2 Using injections of 2 to 5 μL, an lyze each calibration standard according Section 12 and tabulate peak height or a responses against concentration for ea compound and internal standard. Calcul response factors (RF) for each compou using Equation 1.

Equation 1.

$$RF = \frac{(A_s)(C_{is})}{(A_{is})(C_s)}$$

where:

A_s=Response for the parameter to measured.

A_{is}=Response for the internal standard

C_{is}=Concentration of the internal sta ard (μg/L).

C_s=Concentration of the parameter to measured (μg/L).

If the RF value over the working rang a constant (< 10% RSD), the RF can be sumed to be invariant and the average RF can be used for calculations. Alternatively, the results can be used to plot a calibration curve of response ratios, A_s/A_{is}, vs. RF.

7.4 The working calibration curve, calibration factor, or RF must be verified on each working day by the measurement of one or more calibration standards. If the response for any parameter varies from the predicted response by more than ± 15%, a new calibration curve must be prepared for that compound.

7.5 Before using any cleanup procedure, the analyst must process a series of calibration standards through the procedure to validate elution patterns and the absence of interferences from the reagents.

8. Quality Control

8.1 Each laboratory that uses this method is required to operate a formal quality control program. The minimum requirements of this program consist of an initial demonstration of laboratory capability and an ongoing analysis of spiked samples to evaluate and document data quality. The laboratory must maintain records to document the quality of data that is generated. Ongoing data quality checks are compared with established performance criteria to determine if the results of analyses meet the performance characteristics of the method. When results of sample spikes indicate atypical method performance, a quality control check standard must be analyzed to confirm that the measurements were performed in an in-control mode of operation.

8.1.1 The analyst must make an initial, one-time, demonstration of the ability to generate acceptable accuracy and precision with this method. This ability is established as described in Section 8.2.

8.1.2 In recognition of advances that are occurring in chromatography, the analyst is permitted certain options (detailed in Sections 10.4, 11.1, and 12.1) to improve the separations or lower the cost of measurements. Each time such a modification is made to the method, the analyst is required to repeat the procedure in Section 8.2.

8.1.3 Before processing any samples, the analyst must analyze a reagent water blank to demonstrate that interferences from the analytical system and glassware are under control. Each time a set of samples is extracted or reagents are changed, a reagent water blank must be processed as a safeguard against laboratory contamination.

8.1.4 The laboratory must, on an ongoing basis, spike and analyze a minimum of 10% of all samples to monitor and evaluate laboratory data quality. This procedure is described in Section 8.3.

8.1.5 The laboratory must, on an ongoing basis, demonstrate through the analyses of quality control check standards that the operation of the measurement system is in control. This procedure is described in Section 8.4. The frequency of the check standard analyses is equivalent to 10% of all samples analyzed but may be reduced if spike recoveries from samples (Section 8.3) meet all specified quality control criteria.

8.1.6 The laboratory must maintain performance records to document the quality of data that is generated. This procedure is described in Section 8.5.

8.2 To establish the ability to generate acceptable accuracy and precision, the analyst must perform the following operations.

8.2.1 A quality control (QC) check sample concentrate is required containing each parameter of interest in acetone at a concentration of 20 μg/mL for each dinitrotoluene and 100 μg/mL for isophorone and nitrobenzene. The QC check sample concentrate must be obtained from the U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory in Cincinnati, Ohio, if available. If not available from that source, the QC check sample concentrate must be obtained from another external source. If not available from either source above, the QC check sample concentrate must be prepared by the laboratory using stock standards prepared independently from those used for calibration.

8.2.2 Using a pipet, prepare QC check samples at the test concentrations shown in Table 2 by adding 1.00 mL of QC check sample concentrate to each of four 1-L aliquots of reagent water.

8.2.3 Analyze the well-mixed QC check samples according to the method beginning in Section 10.

8.2.4 Calculate the average recovery ($\bar{X}$) in μg/L, and the standard deviation of the recovery (s) in μg/L, for each parameter using the four results.

8.2.5 For each parameter compare s and $\bar{X}$ with the corresponding acceptance criteria for precision and accuracy, respectively, found in Table 2. If s and $\bar{X}$ for all parameters of interest meet the acceptance criteria, the system performance is acceptable and analysis of actual samples can begin. If any individual s exceeds the precision limit or any individual $\bar{X}$ falls outside the range for accuracy, the system performance is unacceptable for that parameter. Locate and correct the source of the problem and repeat the test for all parameters of interest beginning with Section 8.2.2.

8.3 The laboratory must, on an ongoing basis, spike at least 10% of the samples from each sample site being monitored to assess accuracy. For laboratories analyzing one to ten samples per month, at least one spiked sample per month is required.

8.3.1 The concentration of the spike in the sample should be determined as follows:

8.3.1.1 If, as in compliance monitoring, the concentration of a specific parameter in the sample is being checked against a regulatory concentration limit, the spike should be at that limit or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.2 If the concentration of a specific parameter in the sample is not being checked against a limit specific to that parameter, the spike should be at the test concentration in Section 8.2.2 or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.3 If it is impractical to determile background levels before spiking (e.g., maximum holding times will be exceeded), the spike concentration should be (1) the regulatory concentration limit, if any; or, if none (2) the larger of either 5 times higher than the expected background concentration or the test concentration in Section 8.2.2.

8.3.2 Analyze one sample aliquot to determine the background concentration (B) of each parameter. If necessary, prepare a new QC check sample concentrate (Section 8.2.1) appropriate for the background concentrations in the sample. Spike a second sample aliquot with 1.0 mL of the QC check sample concentrate and analyze it to determine the concentration after spiking (A) of each parameter. Calculate each percent recovery (P) as 100 (A-B)%/T, where T is the known true value of the spike.

8.3.3 Compare the percent recovery (P) for each parameter with the corresponding QC acceptance criteria found in Table 2. These acceptance criteria were calculated to include an allowance for error in measurement of both the background and spike concentrations, assuming a spike to background ratio of 5:1. This error will be accounted for to the extent that the analyst's spike to background ratio approaches 5:1.[7] If spiking was performed at a concentration lower than the test concentration in Section 8.2.2, the analyst must use either the QC acceptance criteria in Table 2, or optional QC acceptance criteria calculated for the specific spike concentration. To calculate optional acceptance criteria for the recovery of a parameter: (1) Calculate accuracy (X') using the equation in Table 3, substituting the spike concentration (T) for C; (2) calculate overall precision (S') using the equation in Table 3, substituting X' for $\bar{X}$8; (3) calculate the range for recovery at the spike concentration as (100 X'/T) ± 2.44 (100 S'/T)%.[7]

8.3.4 If any individual P falls outside the designated range for recovery, that parameter has failed the acceptance criteria. A check standard containing each parameter that failed the criteria must be analyzed as described in Section 8.4.

8.4. If any parameter fails the acceptance criteria for recovery in Section 8.3, a QC check standard containing each parameter that failed must be prepared and analyzed.

NOTE: The frequency for the required analysis of a QC check standard will depend upon the number of parameters being simultaneously tested, the complexity of the sample matrix, and the performance of the laboratory.

8.4.1 Prepare the QC check standard by adding 1.0 mL of QC check sample concentrate (Section 8.2.1 or 8.3.2) to 1 L of reagent water. The QC check standard needs only to contain the parameters that failed criteria in the test in Section 8.3.

8.4.2 Analyze the QC check standard to determine the concentration measured (A) of each parameter. Calculate each percent recovery (P_s) as 100 (A/T)%, where T is the true value of the standard concentration.

8.4.3 Compare the percent recovery (P_s) for each parameter with the corresponding QC acceptance criteria found in Table 2. Only parameters that failed the test in Section 8.3 need to be compared with these criteria. If the recovery of any such parameter falls outside the designated range, the laboratory performance for that parameter is judged to be out of control, and the problem must be immediately identified and corrected. The analytical result for that parameter in the unspiked sample is suspect and may not be reported for regulatory compliance purposes.

8.5 As part of QC program for the laboratory, method accuracy for wastewater samples must be assessed and records must be maintained. After the analysis of five spiked wastewater samples as in Section 8.3, calculate the average percent recovery ($\bar{P}$) and the standard deviation of the percent recovery (s_p). Express the accuracy assessment as a percent recovery interval from $\bar{P}-2s_p$ to $\bar{P}+2s_p$. If $\bar{P}=90\%$ and $s_p = 10\%$, for example, the accuracy interval is expressed as 70-110%. Update the accuracy assessment for each parameter on a regular basis (e.g., after each five to ten new accuracy measurements).

8.6 It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Field duplicates may be analyzed to assess the precision of the environmental measurements. When doubt exists over the identification of a peak on the chromatogram, confirmatory techniques such as gas chromatography with a dissimilar column, specific element detector, or mass spectrometer must be used. Whenever possible, the laboratory should analyze standard reference materials and participate in relevant performance evaluation studies.

9. Sample Collection, Preservation, and Handling

9.1 Grab samples must be collected in glass containers. Conventional sampling practices[8] should be followed, except that the bottle must not be prerinsed with sample before collection. Composite samples should be collected in refrigerated glass containers in accordance with the requirements of the program. Automatic sampling equipment must be as free as possible of Tygon tubing and other potential sources of contamination.

9.2 All samples must be iced or refrigerated at 4 °C from the time of collection until extraction.

9.3 All samples must be extracted within 7 days of collection and completely analyzed within 40 days of extraction.[2]

10. Sample Extraction

10.1 Mark the water meniscus on the side of the sample bottle for later determination of sample volume. Pour the entire sample into a 2-L separatory funnel. Check the pH of the sample with wide-range pH paper and adjust to within the range of 5 to 9 with sodium hydroxide solution or sulfuric acid.

10.2 Add 60 mL of methylene chloride to the sample bottle, seal, and shake 30 s to rinse the inner surface. Transfer the solvent to the separatory funnel and extract the sample by shaking the funnel for 2 min. with periodic venting to release excess pressure. Allow the organic layer to separate from the water phase for a minimum of 10 min. If the emulsion interface between layers is more than one-third the volume of the solvent layer, the analyst must employ mechanical techniques to complete the phase separation. The optimum technique depends upon the sample, but may include stirring, filtration of the emulsion through glass wool, centrifugation, or other physical methods. Collect the methylene chloride extract in a 250-mL Erlenmeyer flask.

10.3 Add a second 60-mL volume of methylene chloride to the sample bottle and repeat the extraction procedure a second time, combining the extracts in the Erlenmeyer flask. Perform a third extraction in the same manner.

10.4 Assemble a Kuderna-Danish (K-D) concentrator by attaching a 10-mL concentrator tube to a 500-mL evaporative flask. Other concentration devices or techniques may be used in place of the K-D concentrator if the requirements of Section 8.2 are met.

10.5 Pour the combined extract through a solvent-rinsed drying column containing about 10 cm of anhydrous sodium sulfate, and collect the extract in the K-D concentrator. Rinse the Erlenmeyer flask and column with 20 to 30 mL of methylene chloride to complete the quantitative transfer.

10.6 Sections 10.7 and 10.8 describe a procedure for exchanging the methylene chloride solvent to hexane while concentrating the extract volume to 1.0 mL. When it is not necessary to achieve the MDL in Table 2, the solvent exchange may be made by the addition of 50 mL of hexane and concentration to 10 mL as described in Method 606, Sections 10.7 and 10.8.

10.7 Add one or two clean boiling chips to the evaporative flask and attach a three-ball Snyder column. Prewet the Snyder column by adding about 1 mL of methylene chloride to the top. Place the K-D apparatus on a hot water bath (60 to 65 °C) so that the concentrator tube is partially immersed in the hot water, and the entire lower rounded surface of the flask is bathed with hot vapor. Adjust the vertical position of the apparatus and the water temperature as required to complete the concentration in 15 to 20 min. At the proper rate of distillation the balls of the column will actively chatter but the chambers will not flood with condensed solvent. When the apparent volume of liquid reaches 1 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 min.

10.8 Remove the Snyder column and rinse the flask and its lower joint into the concentrator tube with 1 to 2 mL of methylene chloride. A 5-mL syringe is recommended for this operation. Add 1 to 2 mL of hexane and a clean boiling chip to the concentrator tube and attach a two-ball micro-Snyder column. Prewet the column by adding about 0.5 mL of hexane to the top. Place the micro-K-D apparatus on a hot water bath (60 to 65 °C) so that the concentrator tube is partially immersed in the hot water. Adjust the vertical position of the apparatus and the water temperature as required to complete the concentration in 5 to 10 min. At the proper rate of distillation the balls of the column will actively chatter but the chambers will not flood. When the apparent volume of liquid reaches 0.5 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 min.

10.9 Remove the micro-Snyder column and rinse its lower joint into the concentrator tube with a minimum amount of hexane. Adjust the extract volume to 1.0 mL. Stopper the concentrator tube and store refrigerated if further processing will not be performed immediately. If the extract will be stored longer than two days, it should be transferred to a Teflon-sealed screw-cap vial. If the sample extract requires no further cleanup, proceed with gas chromatographic analysis (Section 12). If the sample requires further cleanup, proceed to Section 11.

10.10 Determine the original sample volume by refilling the sample bottle to the mark and transferring the liquid to a 1000-

mL graduated cylinder. Record the sample volume to the nearest 5 mL.

11. Cleanup and Separation

11.1 Cleanup procedures may not be necessary for a relatively clean sample matrix. If particular circumstances demand the use of a cleanup procedure, the analyst may use the procedure below or any other appropriate procedure. However, the analyst first must demonstrate that the requirements of Section 8.2 can be met using the method as revised to incorporate the cleanup procedure.

11.2 Florisil column cleanup:

11.2.1 Prepare a slurry of 10 g of activated Florisil in methylene chloride/hexane (1+9)(V/V) and place the Florisil into a chromatographic column. Tap the column to settle the Florisil and add 1 cm of anhydrous sodium sulfate to the top. Adjust the elution rate to about 2 mL/min.

11.2.2 Just prior to exposure of the sodium sulfate layer to the air, quantitatively transfer the sample extract onto the column using an additional 2 mL of hexane to complete the transfer. Just prior to exposure of the sodium sulfate layer to the air, add 30 mL of methylene chloride/hexane (1 + 9)(V/V) and continue the elution of the column. Discard the eluate.

11.2.3 Next, elute the column with 30 mL of acetone/methylene chloride (1 + 9)(V/V) into a 500-mL K-D flask equipped with a 10-mL concentrator tube. Concentrate the collected fraction as in Sections 10.6, 10.7, 10.8, and 10.9 including the solvent exchange to 1 mL of hexane. This fraction should contain the nitroaromatics and isophorone. Analyze by gas chromatography (Section 12).

12. Gas Chromatography

12.1 Isophorone and nitrobenzene are analyzed by injection of a portion of the extract into an FIDGC. The dinitrotoluenes are analyzed by a separate injection into an ECDGC. Table 1 summarizes the recommended operating conditions for the gas chromatograph. Included in this table are retention times and MDL that can be achieved under these conditions. Examples of the separations achieved by Column 1 are shown in Figures 1 and 2. Other packed or capillary (open-tubular) columns, chromatographic conditions, or detectors may be used if the requirements of Section 8.2 are met.

12.2 Calibrate the system daily as described in Section 7.

12.3 If the internal standard calibration procedure is being used, the internal standard must be added to the same extract and mixed thoroughly immediately before injection into the gas chromatograph.

12.4 Inject 2 to 5 μL of the sample extract or standard into the gas chromatograph using the solvent-flush technique. Smaller (1.0 μL) volumes may be injected if automatic devices are employed. Record the volume injected to the nearest 0.05 μL, the total extract volume, and the resulting peak size in area or peak height units.

12.5 Identify the parameters in the sample by comparing the retention times of the peaks in the sample chromatogram with those of the peaks in standard chromatograms. The width of the retention time window used to make identifications should be based upon measurements of actual retention time variations of standards over the course of a day. Three times the standard deviation of a retention time for a compound can be used to calculate a suggested window size; however, the experience of the analyst should weigh heavily in the interpretation of chromatograms.

12.6 If the response for a peak exceeds the working range of the system, dilute the extract and reanalyze.

12.7 If the measurement of the peak response is prevented by the presence of interferences, further cleanup is required.

13. Calculations

13.1 Determine the concentration of individual compounds in the sample.

13.1.1 If the external standard calibration procedure is used, calculate the amount of material injected from the peak response using the calibration curve or calibration factor determined in Section 7.2.2. The concentration in the sample can be calculated from Equation 2.

$$\text{Concentration } (\mu g/L) = \frac{(A)(V_t)}{(V_i)(V_s)}$$

Equation 2

where:

A = Amount of material injected (ng).

V_i = Volume of extract injected (μL).

V_t = Volume of total extract (μL).

V_s = Volume of water extracted (mL).

13.1.2 If the internal standard calibration procedure is used, calculate the concentration in the samle using the response factor (RF) determined in Section 7.3.2 and Equation 3.

$$\text{Concentration } (\mu g/L) = \frac{(A_s)(I_s)}{(A_{is})(RF)(V_o)}$$

Equation 3

where:

A_s=Response for the parameter to be measured.

A_{is}=Response for the internal standard.

I_s=Amount of internal standard added to each extract (μg).

V_o=Volume of water extracted (L).

13.2 Report results in μg/L without correction for recovery data. All QC data obtained should be reported with the sample results.

14. Method Performance

14.1 The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero.[1] The MDL concentrations listed in Table 1 were obtained using reagent water.[10] Similar results were achieved using representative wastewaters. The MDL actually achieved in a given analysis will vary depending on instrument sensitivity and matrix effects.

14.2 This method has been tested for linearity of spike recovery from reagent water and has been demonstrated to be applicable over the concentration range from 7×MDL to 1000×MDL.[10]

14.3 This method was tested by 18 laboratories using reagent water, drinking water, surface water, and three industrial wastewaters spiked at six concentrations over the range 1.0 to 515 μg/L.[11] Single operator precision, overall precision, and method accuracy were found to be directly related to the concentration of the parameter and essentially independent of the sample matrix. Linear equations to describe these relationships are presented in Table 3.

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5. "OSHA Safety and Health Standards, General Industry," (29 CFR Part 1910), Occupational Safety and Health Administration, OSHA 2206 (Revised, January 1976).

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11. "EPA Method Study 19, Method 609 (Nitroaromatics and Isophorone)," EPA 600/4-84-018, National Technical Information Service, PB84-176908, Springfield, Virginia 22161, March 1984.

TABLE 1.—CHROMATOGRAPHIC CONDITIONS AND METHOD DETECTION LIMITS

Parameter	Retention time (min)		Method detection limit (μg/L)	
	Col. 1	Col. 2	ECDGC	FIDGC
Nitrobenzene	3.31	4.31	13.7	3.6
2,6-Dinitrotoluene	3.52	4.75	0.01	—
Isophorone	4.49	5.72	15.7	5.7
2,4-Dinitrotoluene	5.35	6.54	0.02	—

Column 1 conditions: Gas-Chrom Q (80/100 mesh) coated with 1.95% QF-1/1.5% OV-17 packed in a 1.2 m long × 2 mm or 4 mm ID glass column. A 2 mm ID column and nitrogen carrier gas at 44 mL/min flow rate were used when determining isophorone and nitrobenzene by FIDGC. The column temperature was held isothermal at 85 °C. A 4 mm ID column and 10% methane/90% argon carrier gas at 44 mL/min flow rate were used when determining the dinitrotoluenes by ECDGC. The column temperature was held isothermal at 145 °C.

Column 2 conditions: Gas-Chrom Q (80/100 mesh) coated with 3% OV-101 packed in a 3.0 m long × 2 mm or 4 mm ID glass column. A 2 mm ID column and nitrogen carrier gas at 44 mL/min flow rate were used when determining isophorone and nitrobenzene by FIDGC. The column temperature was held isothermal at 100 °C. A 4 mm ID column and 10% methane/90% argon carrier gas at 44 mL/min flow rate were used when determining the dinitrotoluenes by ECDGC. The column temperature was held isothermal at 150 °C.

TABLE 2.—QC ACCEPTANCE CRITERIA—METHOD 609

Parameter	Test Conc. (µg/L)	Limit for s (µg/L)	Range for $\bar{X}$ (µg/L)	Range for P, P_s (%)
2,4-Dinitrotoluene	20	5.1	3.6–22.8	6–125
2,6-Dinitrotoluene	20	4.8	3.8–23.0	8–126
Isophorone	100	32.3	8.0–100.0	D–117
Nitrobenzene	100	33.3	25.7–100.0	6–118

s=Standard deviation of four recovery measurements, i µg/L (Section 8.2.4).

$\bar{X}$=Average recovery for four recovery measurements, i µg/L (Section 8.2.4).

P, P_s=Percent recovery measured (Section 8.3.2, Secti 8.4.2).

D=Detected; result must be greater than zero.

NOTE: These criteria are based directly upon the metho performance data in Table 3. Where necessary, the limits fo recovery have been broadened to assure applicability of th limits to concentrations below those used to develop Tab 3.

TABLE 3.—METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION—METHOD 609

Parameter	Accuracy, as recovery, X' (µg/L)	Single analyst precision, s_r' (µg/L)	Overall precision, S' (µg/L)
2,4-Dinitrotoluene	0.65C+0.22	$0.20\bar{X}+0.08$	$0.37\bar{X}-0.07$
2,6-Dinitrotoluene	0.66C+0.20	$0.19\bar{X}+0.06$	$0.36\bar{X}-0.0$
Isophorone	0.49C+2.93	$0.28\bar{X}+2.77$	$0.46\bar{X}+0.31$
Nitrobenzene	0.60C+2.00	$0.25\bar{X}+2.53$	$0.37\bar{X}-0.7$

X'=Expected recovery for one or more measurements of a sample containing a concentration of C, in µg/L.

s_r'=Expected single analyst standard deviation of measurements at an average concentration found of $\bar{X}$, in µg/L.

S'=Expected interlaboratory standard deviation of measurements at an average concentration found of $\bar{X}$, in µg/L.

C=True value for the concentration, in µg/L.

$\bar{X}$=Average recovery found for measurements of samples containing a concentration of C, in µg/L.

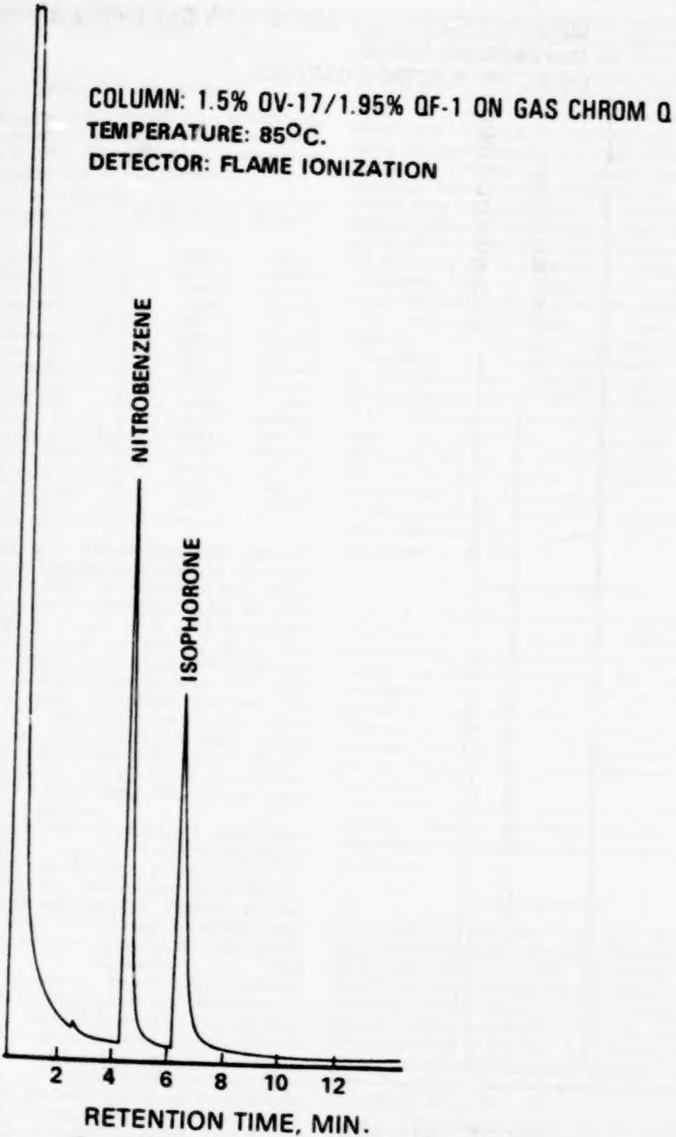

Figure 1. **Gas chromatogram of nitrobenzene and isophorone.**

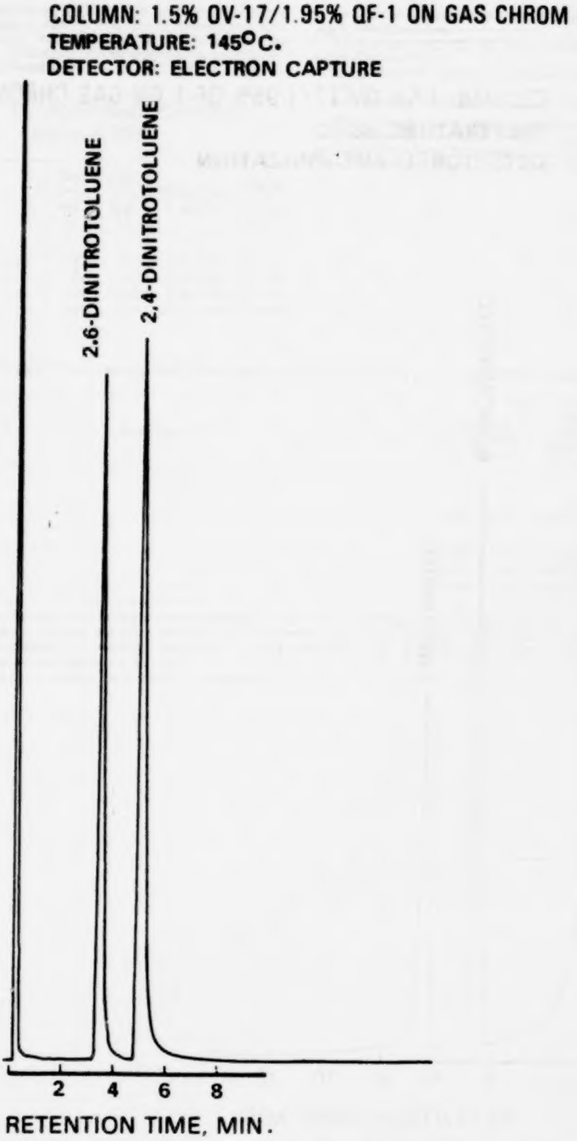

Figure 2. Gas chromatogram of dinitrotoluenes.

METHOD 610—POLYNUCLEAR AROMATIC HYDROCARBONS

1. Scope and Application

1.1 This method covers the determination of certain polynuclear aromatic hydrocarbons (PAH). The following parameters can be determined by this method:

Parameter	STORET No.	CAS No.
Acenaphthene	34205	83-32-9
Acenaphthylene	34200	208-96-8
Anthracene	34220	120-12-7
Benzo(a)anthracene	34526	56-55-3
Benzo(a)pyrene	34247	50-32-8
Benzo(b)fluoranthene	34230	205-99-2
Benzo(ghi)perylene	34521	191-24-2
Benzo(k)fluoranthene	34242	207-08-9
Chrysene	34320	218-01-9
Dibenzo(a,h)anthracene	34556	53-70-3
Fluoranthene	34376	206-44-0
Fluorene	34381	86-73-7
Indeno(1,2,3-cd)pyrene	34403	193-39-5
Naphthalene	34696	91-20-3
Phenanthrene	34461	85-01-8
Pyrene	34469	129-00-0

1.2 This is a chromatographic method applicable to the determination of the compounds listed above in municipal and industrial discharges as provided under 40 CFR 136.1. When this method is used to analyze unfamiliar samples for any or all of the compounds above, compound identifications should be supported by at least one additional qualitative technique. Method 625 provides gas chromatograph/mass spectrometer (GC/MS) conditions appropriate for the qualitative and quantitative confirmation of results for many of the parameters listed above, using the extract produced by this method.

1.3 This method provides for both high performance liquid chromatographic (HPLC) and gas chromatographic (GC) approaches for the determination of PAHs. The gas chromatographic procedure does not adequately resolve the following four pairs of compounds: Anthracene and phenanthrene; chrysene and benzo(a)anthracene; benzo(b)fluoranthene and benzo(k)fluoranthene; and dibenzo(a,h) anthracene and indeno (1,2,3-cd)pyrene. Unless the purpose for the analysis can be served by reporting the sum of an unresolved pair, the liquid chromatographic approach must be used for these compounds. The liquid chromatographic method does resolve all 16 of the PAHs listed.

1.4 The method detection limit (MDL, defined in Section 15.1)[1] for each parameter is listed in Table 1. The MDL for a specific wastewater may differ from those listed, depending upon the nature of interferences in the sample matrix.

1.5 The sample extraction and concentration steps in this method are essentially the same as in Methods 606, 608, 609, 611, and 612. Thus, a single sample may be extracted to measure the parameters included in the scope of each of these methods. When cleanup is required, the concentration levels must be high enough to permit selecting aliquots, as necessary, to apply appropriate cleanup procedures. Selection of the aliquots must be made prior to the solvent exchange steps of this method. The analyst is allowed the latitude, under Sections 12 and 13, to select chromatographic conditions appropriate for the simultaneous measurement of combinations of these parameters.

1.6 Any modification of this method, beyond those expressly permitted, shall be considered as a major modification subject to application and approval of alternate test procedures under 40 CFR 136.4 and 136.5.

1.7 This method is restricted to use by or under the supervision of analysts experienced in the use of HPLC and GC systems and in the interpretation of liquid and gas chromatograms. Each analyst must demonstrate the ability to generate acceptable results with this method using the procedure described in Section 8.2.

2. Summary of Method

2.1 A measured volume of sample, approximately 1-L, is extracted with methylene chloride using a separatory funnel. The methylene chloride extract is dried and concentrated to a volume of 10 mL or less. The extract is then separated by HPLC or GC. Ultraviolet (UV) and fluorescence detectors are used with HPLC to identify and measure the PAHs. A flame ionization detector is used with GC.[2]

2.2 The method provides a silica gel column cleanup procedure to aid in the elimination of interferences that may be encountered.

3. Interferences

3.1 Method interferences may be caused by contaminants in solvents, reagents, glassware, and other sample processing hardward that lead to discrete artifacts and/or elevated baselines in the chromatograms. All of these materials must be routinely demonstrated to be free from interferences under the conditions of the analysis by running laboratory reagent blanks as described in Section 8.1.3.

3.1.1 Glassware must be scrupulously cleaned.[3] Clean all glassware as soon as possible after use by rinsing with the last solvent used in it. Solvent rinsing should be followed by detergent washing with hot water, and rinses with tap water and distilled water. The glassware should then be drained dry, and heated in a muffle furnace at 400 °C for 15 to 30 min. Some thermally stable materials, such as PCBs, may not be eliminated by this treatment. Solvent rinses with acetone and pesticide quality hexane may be substituted for the muffle furnace heating. Thorough rinsing with such solvents usually eliminates PCB interference. Volumetric ware should not be heated in a muffle furnace. After drying and cooling, glassware should be sealed and stored in a clean environment to prevent any accumulation of dust or other contaminants. Store inverted or capped with aluminum foil.

3.1.2 The use of high purity reagents and solvents helps to minimize interference problems. Purification of solvents by distillation in all-glass systems may be required.

3.2 Matrix interferences may be caused by contaminants that are co-extracted from the sample. The extent of matrix interferences will vary considerably from source to source, depending upon the nature and diversity of the industrial complex or municipality being sampled. The cleanup procedure in Section 11 can be used to overcome many of these interferences, but unique samples may require additional cleanup approaches to achieve the MDL listed in Table 1.

3.3 The extent of interferences that may be encountered using liquid chromatographic techniques has not been fully assessed. Although the HPLC conditions described allow for a unique resolution of the specific PAH compounds covered by this method, other PAH compounds may interfere.

4. Safety

4.1 The toxicity or carcinogenicity of each reagent used in this method have not been precisely defined; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material data handling sheets should also be made available to all personnel involved in the chemical analysis. Additional references to laboratory safety are available and have been identified[4-6] for the information of the analyst.

4.2 The following parameters covered by this method have been tentatively classified as known or suspected, human or mammalian carcinogens: benzo(a)anthracene, benzo(a)pyrene, and dibenzo(a,h)-anthracene. Primary standards of these toxic compounds should be prepared in a hood. A NIOSH/MESA approved toxic gas respirator should be worn when the analyst handles high concentrations of these toxic compounds.

5. Apparatus and Materials

5.1 Sampling equipment, for discre
composite sampling.

5.1.1 Grab sample bottle—1-L or
amber glass, fitted with a screw cap
with Teflon. Foil may be substitute
Teflon if the sample is not corrosiv
amber bottles are not available, protect
ples from light. The bottle and cap
must be washed, rinsed with aceton
methylene chloride, and dried before u
minimize contamination.

5.1.2 Automatic sampler (optional)—
sampler must incorporate glass sample
tainers for the collection of a minimu
250 mL of sample. Sample containers
be kept refrigerated at 4 °C and prote
from light during compositing. If the
pler uses a peristaltic pump, a mini
length of compressible silicone ru
tubing may be used. Before use, howe
the compressible tubing should be t
oughly rinsed with methanol, followe
repeated rinsings with distilled wate
minimize the potential for contaminatio
the sample. An integrating flow meter
quired to collect flow proportional com
ites.

5.2 Glassware (All specifications are
gested. Catalog numbers are included fo
lustration only.):

5.2.1 Separatory funnel—2-L,
Teflon stopcock.

5.2.2 Drying column—Chromatogra
column, approximately 400 mm long ×
mm ID, with coarse frit filter disc.

5.2.3 Concentrator tube, Kude
Danish—10-mL, graduated (Kontes
570050-1025 or equivalent). Calibrat
must be checked at the volumes emplo
in the test. Ground glass stopper is use
prevent evaporation of extracts.

5.2.4 Evaporative flask, Kuder
Danish—500-mL (Kontes K-570001-0500
equivalent). Attach to concentrator t
with springs.

5.2.5 Snyder column, Kuderna-Danis
Three-ball macro (Kontes K-503000-0121
equivalent).

5.2.6 Snyder column, Kuderna-Danis
Two-ball micro (Kontes K-569001-0219
equivalent).

5.2.7 Vials—10 to 15-mL, amber gl
with Teflon-lined screw cap.

5.2.8 Chromatographic column—250
long x 10 mm ID, with coarse frit filter d
at bottom and Teflon stopcock.

5.3 Boiling chips—Approximately 10/
mesh. Heat to 400 °C for 30 min or Soxhl
extract with methylene chloride.

5.4 Water bath—Heated, with concent
ring cover, capable of temperature cont
(±2 °C). The bath should be used in a hoo

5.5 Balance—Analytical, capable of acc
rately weighing 0.0001 g.

5.6 High performance liquid chromatograph (HPLC)—An analytical system complete with column supplies, high pressure syringes, detectors, and compatible strip-chart recorder. A data system is recommended for measuring peak areas and retention times.

5.6.1 Gradient pumping system—Constant flow.

5.6.2 Reverse phase column—HC-ODS Sil-X, 5 micron particle diameter, in a 25 cm x 2.6 mm ID stainless steel column (Perkin Elmer No. 089-0716 or equivalent). This column was used to develop the method performance statements in Section 15. Guidelines for the use of alternate column packings are provided in Section 12.2.

5.6.3 Detectors—Fluorescence and/or UV detectors. The fluorescence detector is used for excitation at 280 nm and emission greater than 389 nm cutoff (Corning 3-75 or equivalent). Fluorometers should have dispersive optics for excitation and can utilize either filter or dispersive optics at the emission detector. The UV detector is used at 254 nm and should be coupled to the fluorescence detector. These detectors were used to develop the method performance statements in Section 15. Guidelines for the use of alternate detectors are provided in Section 12.2.

5.7 Gas chromatograph—An analytical system complete with temperature programmable gas chromatograph suitable for on-column or splitless injection and all required accessories including syringes, analytical columns, gases, detector, and strip-chart recorder. A data system is recommended for measuring peak areas.

5.7.1 Column—1.8 m long x 2 mm ID glass, packed with 3% OV-17 on Chromosorb W-AW-DCMS (100/120 mesh) or equivalent. This column was used to develop the retention time data in Table 2. Guidelines for the use of alternate column packings are provided in Section 13.3.

5.7.2 Detector—Flame ionization detector. This detector has proven effective in the analysis of wastewaters for the parameters listed in the scope (Section 1.1), excluding the four pairs of unresolved compounds listed in Section 1.3. Guidelines for the use of alternate detectors are provided in Section 13.3.

6. *Reagents*

6.1 Reagent water—Reagent water is defined as a water in which an interferent is not observed at the MDL of the parameters of interest.

6.2 Sodium thiosulfate—(ACS) Granular.

6.3 Cyclohexane, methanol, acetone, methylene chloride, pentane—Pesticide quality or equivalent.

6.4 Acetonitrile—HPLC quality, distilled in glass.

6.5 Sodium sulfate—(ACS) Granular, anhydrous. Purify by heating at 400 °C for 4 h in a shallow tray.

6.6 Silica gel—100/200 mesh, desiccant, Davison, grade-923 or equivalent. Before use, activate for at least 16 h at 130 °C in a shallow glass tray, loosely covered with foil.

6.7 Stock standard solutions (1.00 µg/µL)—Stock standard solutions can be prepared from pure standard materials or purchased as certified solutions.

6.7.1 Prepare stock standard solutions by accurately weighing about 0.0100 g of pure material. Dissolve the material in acetonitrile and dilute to volume in a 10-mL volumetric flask. Larger volumes can be used at the convenience of the analyst. When compound purity is assayed to be 96% or greater, the weight can be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards can be used at any concentration if they are certified by the manufacturer or by an independent source.

6.7.2 Transfer the stock standard solutions into Teflon-sealed screw-cap bottles. Store at 4 °C and protect from light. Stock standard solutions should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

6.7.3 Stock standard solutions must be replaced after six months, or sooner if comparison with check standards indicates a problem.

6.8 Quality control check sample concentrate—See Section 8.2.1.

7. *Calibration*

7.1 Establish liquid or gas chromatographic operating conditions equivalent to those given in Table 1 or 2. The chromatographic system can be calibrated using the external standard technique (Section 7.2) or the internal standard technique (Section 7.3).

7.2 External standard calibration procedure:

7.2.1 Prepare calibration standards at a minimum of three concentration levels for each parameter of interest by adding volumes of one or more stock standards to a volumetric flask and diluting to volume with acetonitrile. One of the external standards should be at a concentration near, but above, the MDL (Table 1) and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the detector.

7.2.2 Using injections of 5 to 25 µL for HPLC and 2 to 5 µL for GC, analyze each calibration standard according to Section 12 or 13, as appropriate. Tabulate peak height or area responses against the mass injected. The results can be used to prepare a calibration curve for each compound. Alternatively, if the ratio of response to amount injected (calibration factor) is a constant over the working range (<10% relative standard deviation, RSD), linearity through the origin can be assumed and the average ratio or calibration factor can be used in place of a calibration curve.

7.3 Internal standard calibration procedure—To use this approach, the analyst must select one or more internal standards that are similar in analytical behavior to the compounds of interest. The analyst must further demonstrate that the measurement of the internal standard is not affected by method or matrix interferences. Because of these limitations, no internal standard can be suggested that is applicable to all samples.

7.3.1 Prepare calibration standards at a minimum of three concentration levels for each parameter of interest by adding volumes of one or more stock standards to a volumetric flask. To each calibration standard, add a known constant amount of one or more internal standards, and dilute to volume with acetonitrile. One of the standards should be at a concentration near, but above, the MDL and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the detector.

7.3.2 Using injections of 5 to 25 μL for HPLC and 2 to 5 μL for GC, analyze each calibration standard according to Section 12 or 13, as appropriate. Tabulate peak height or area responses against concentration for each compound and internal standard. Calculate response factors (RF) for each compound using Equation 1.

$$RF=\frac{(A_s)(C_{is})}{(A_{is})(C_s)}$$

Equation 1

where:

A_s=Response for the parameter to be measured.

A_{is}=Response for the internal standard.

C_{is}=Concentration of the internal standard (μg/L).

C_s=Concentration of the parameter to be measured (μg/L).

If the RF value over the working range is a constant (<10% RSD), the RF can be assumed to be invariant and the average RF can be used for calculations. Alternatively, the results can be used to plot a calibration curve of response ratios, A_s/A_{is}, vs. RF.

7.4 The working calibration curve, calibration factor, or RF must be verified on
each working day by the measuremen
one or more calibration standards. If th
sponse for any parameter varies from
predicted response by more than ±15%
test must be repeated using a fresh ca
tion standard. Alternatively, a new ca
tion curve must be prepared for that
pound.

7.5 Before using any cleanup proce
the analyst must process a series of cal
tion standards through the procedur
validate elution patterns and the absen
interferences from the reagents.

8. Quality Control

8.1 Each laboratory that uses
method is required to operate a formal
ity control program. The minimum req
ments of this program consist of an in
demonstration of laboratory capability
an ongoing analysis of spiked sample
evaluate and document data quality.
laboratory must maintain records to d
ment the quality of data that is gener
Ongoing data quality checks are comp
with established performance criteria to
termine if the results of analyses meet
performance characteristics of the met
When results of sample spikes indi
atypical method performance, a quality
trol check standard must be analyzed
confirm that the measurements were
formed in an in-control mode of operatio

8.1.1 The analyst must make an ini
one-time, demonstration of the ability
generate acceptable accuracy and preci
with this method. This ability is establi
as described in Section 8.2.

8.1.2 In recognition of advances that
occurring in chromatography, the analys
permitted certain options (detailed in S
tions 10.4, 11.1, 12.2, and 13.3) to impr
the separations or lower the cost of me
urements. Each time such a modificatio
made to the method, the analyst is requi
to repeat the procedure in Section 8.2.

8.1.3 Before processing any samples t
analyst must analyze a reagent water bla
to demonstrate that interferences from t
analytical system and glassware are und
control. Each time a set of samples is e
tracted or reagents are changed a reag
water blank must be processed as a sa
guard against laboratory contamination.

8.1.4 The laboratory must, on an ongo
basis, spike and analyze a minimum of 10
of all samples to monitor and evaluate lab
ratory data quality. This procedure is d
scribed in Section 8.3.

8.1.5 The laboratory must, on an ongo
basis, demonstrate through the analyses
quality control check standards that the o
eration of the measurement system is
control. This procedure is described in Se
tion 8.4. The frequency of the check sta
ard analyses is equivalent to 10% of all sa

ples analyzed but may be reduced if spike recoveries from samples (Section 8.3) meet all specified quality control criteria.

8.1.6 The laboratory must maintain performance records to document the quality of data that is generated. This procedure is described in Section 8.5.

8.2 To establish the ability to generate acceptable accuracy and precision, the analyst must perform the following operations.

8.2.1 A quality control (QC) check sample concentrate is required containing each parameter of interest at the following concentrations in acetonitrile: 100 μg/mL of any of the six early-eluting PAHs (naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, and anthracene); 5 μg/mL of benzo(k)fluoranthene; and 10 μg/mL of any of the other PAHs. The QC check sample concentrate must be obtained from the U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory in Cincinnati, Ohio, if available. If not available from that source, the QC check sample concentrate must be obtained from another external source. If not available from either source above, the QC check sample concentrate must be prepared by the laboratory using stock standards prepared independently from those used for calibration.

8.2.2 Using a pipet, prepare QC check samples at the test concentrations shown in Table 3 by adding 1.00 mL of QC check sample concentrate to each of four 1-L aliquots of reagent water.

8.2.3 Analyze the well-mixed QC check samples according to the method beginning in Section 10.

8.2.4 Calculate the average recovery ($\bar{X}$) in μg/L, and the standard deviation of the recovery (s) in μg/L, for each parameter using the four results.

8.2.5 For each parameter compare s and $\bar{X}$ with the corresponding acceptance criteria for precision and accuracy, respectively, found in Table 3. If s and $\bar{X}$ for all parameters of interest meet the acceptance criteria, the system performance is acceptable and analysis of actual samples can begin. If any individual s exceeds the precision limit or any individual $\bar{X}$ falls outside the range for accuracy, the system performance is unacceptable for that parameter.

NOTE: The large number of parameters in Table 3 present a substantial probability that one or more will fail at least one of the acceptance criteria when all parameters are analyzed.

8.2.6 When one or more of the parameters tested fail at least one of the acceptance criteria, the analyst must proceed according to Section 8.2.6.1 or 8.2.6.2.

8.2.6.1 Locate and correct the source of the problem and repeat the test for all parameters of interest beginning with Section 8.2.2.

8.2.6.2 Beginning with Section 8.2.2, repeat the test only for those parameters that failed to meet criteria. Repeated failure, however, will confirm a general problem with the measurement system. If this occurs, locate and correct the source of the problem and repeat the test for all compounds of interest beginning with Section 8.2.2.

8.3 The laboratory must, on an ongoing basis, spike at least 10% of the samples from each sample site being monitored to assess accuracy. For laboratories analyzing one to ten samples per month, at least one spiked sample per month is required.

8.3.1 The concentration of the spike in the sample should be determined as follows:

8.3.1.1 If, as in compliance monitoring, the concentration of a specific parameter in the sample is being checked against a regulatory concentration limit, the spike should be at that limit or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.2 If the concentration of a specific parameter in the sample is not being checked against a limit specific to that parameter, the spike should be at the test concentration in Section 8.2.2 or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.3 If it is impractical to determine background levels before spiking (e.g., maximum holding times will be exceeded), the spike concentration should be (1) the regulatory concentration limit, if any; or, if none, (2) the larger of either 5 times higher than the expected background concentration or the test concentration in Section 8.2.2.

8.3.2 Analyze one sample aliquot to determine the background concentration (B) of each parameter. If necessary, prepare a new QC check sample concentrate (Section 8.2.1) appropriate for the background concentrations in the sample. Spike a second sample aliquot with 1.0 mL of the QC check sample concentrate and analyze it to determine the concentration after spiking (A) of each parameter. Calculate each percent recovery (P) as 100 (A-B)%/T, where T is the known true value of the spike.

8.3.3 Compare the percent recovery (P) for each parameter with the corresponding QC acceptance criteria found in Table 3. These acceptance criteria were calculated to include an allowance for error in measurement of both the background and spike concentrations, assuming a spike to background ratio of 5:1. This error will be accounted for to the extent that the analyst's spike to background ratio approaches 5:1.[7] If spiking was performed at a concentration lower than the test concentration in Section 8.2.2, the analyst must use either the QC acceptance criteria in Table 3, or optional QC acceptance criteria calculated for the specific spike concentration. To calculate optional acceptance criteria for the recovery of a parameter: (1) Calculate accuracy (X') using the equation in Table 4, substituting the spike concentration (T) for C; (2) calculate overall precision (S') using the equation in Table 4, substituting X' for $\bar{X}$; (3) calculate the range for recovery at the spike concentration as $(100\,X'/T)\pm 2.44(100\,S'/T)\%$.[7]

8.3.4 If any individual P falls outside the designated range for recovery, that parameter has failed the acceptance criteria. A check standard containing each parameter that failed the critiera must be analyzed as described in Section 8.4.

8.4 If any parameter fails the acceptance criteria for recovery in Section 8.3, a QC check standard containing each parameter that failed must be prepared and analyzed.

NOTE: The frequency for the required analysis of a QC check standard will depend upon the number of parameters being simultaneously tested, the complexity of the sample matrix, and the performance of the laboratory. If the entire list of parameters in Table 3 must be measured in the sample in Section 8.3, the probability that the analysis of a QC check standard will be required is high. In this case the QC check standard should be routinely analyzed with the spike sample.

8.4.1 Prepare the QC check standard by adding 1.0 mL of QC check sample concentrate (Section 8.2.1 or 8.3.2) to 1 L of reagent water. The QC check standard needs only to contain the parameters that failed criteria in the test in Section 8.3.

8.4.2 Analyze the QC check standard to determine the concentration measured (A) of each parameter. Calculate each percent recovery (P_s) as 100 (A/T)%, where T is the true value of the standard concentration.

8.4.3 Compare the percent recovery (P_s) for each parameter with the corresponding QC acceptance criteria found in Table 3. Only parameters that failed the test in Section 8.3 need to be compared with these criteria. If the recovery of any such parameter falls outside the designated range, the laboratory performance for that parameter is judged to be out of control, and the problem must be immediately identified and corrected. The analytical result for that parameter in the unspiked sample is suspect and may not be reported for regulatory compliance purposes.

8.5 As part of the QC program for the laboratory, method accuracy for wastewater samples must be assessed and records must be maintained. After the analysis of five spiked wastewater samples as in Section 8.3, calculate the average percent recovery ($\bar{P}$) and the standard deviation of the percent recovery (s_p). Express the accuracy assessment as a percent recovery interval from $\bar{P}-2s_p$ to $\bar{P}+2s_p$. If $\bar{P}=90\%$ and $s_p=10\%$, for example, the accuracy interval is expressed as 70–110%. Update the accuracy assessment for each parameter on a regular basis (e.g. after each five to ten new accuracy measurements).

8.6 It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Field duplicates may be analyzed to assess the precision of the environmental measurements. When doubt exists over the identification of a peak on the chromatogram, confirmatory techniques such as gas chromatography with a dissimilar column, specific element detector, or mass spectrometer must be used. Whenever possible, the laboratory should analyze standard reference materials and participate in relevant performance evaluation studies.

9. Sample Collection, Preservation, and Handling

9.1 Grab samples must be collected in glass containers. Conventional sampling practices[8] should be followed, except that the bottle must not be prerinsed with sample before collection. Composite samples should be collected in refrigerated glass containers in accordance with the requirements of the program. Automatic sampling equipment must be as free as possible of Tygon tubing and other potential sources of contamination.

9.2 All samples must be iced or refrigerated at 4 °C from the time of collection until extraction. PAHs are known to be light sensitive; therefore, samples, extracts, and standards should be stored in amber or foil-wrapped bottles in order to minimize photolytic decomposition. Fill the sample bottle and, if residual chlorine is present, add 80 mg of sodium thiosulfate per liter of sample and mix well. EPA Methods 330.4 and 330.5 may be used for measurement of residual chlorine.[9] Field test kits are available for this purpose.

9.3 All samples must be extracted within 7 days of collection and completely analyzed within 40 days of extraction.[2]

10. Sample Extraction

10.1 Mark the water meniscus on the side of the sample bottle for later determination of sample volume. Pour the entire sample into a 2-L separatory funnel.

10.2 Add 60 mL of methylene chloride to the sample bottle, seal, and shake 30 s to rinse the inner surface. Transfer the solvent to the separatory funnel and extract the sample by shaking the funnel for 2 min. with periodic venting to release excess pressure. Allow the organic layer to separate from the water phase for a minimum of 10 min. If the emulsion interface between layers is more than one-third the volume of the solvent layer, the analyst must employ mechanical techniques to complete the phase separation. The optimum technique depends upon the sample, but may include stirring, filtration of the emulsion through glass wool, centrifugation, or other physical methods. Collect the methylene chloride extract in a 250-mL Erlenmeyer flask.

10.3 Add a second 60-mL volume of methylene chloride to the sample bottle and repeat the extraction procedure a second time, combining the extracts in the Erlenmeyer flask. Perform a third extraction in the same manner.

10.4 Assemble a Kuderna-Danish (K-D) concentrator by attaching a 10-mL concentrator tube to a 500-mL evaporative flask. Other concentration devices or techniques may be used in place of the K-D concentrator if the requirements of Section 8.2 are met.

10.5 Pour the combined extract through a solvent-rinsed drying column containing about 10 cm of anhydrous sodium sulfate, and collect the extract in the K-D concentrator. Rinse the Erlenmeyer flask and column with 20 to 30 mL of methylene chloride to complete the quantitative transfer.

10.6 Add one or two clean boiling chips to the evaporative flask and attach a three-ball Snyder column. Prewet the Snyder column by adding about 1 mL of methylene chloride to the top. Place the K-D apparatus on a hot water bath (60 to 65 °C) so that the concentrator tube is partially immersed in the hot water, and the entire lower rounded surface of the flask is bathed with hot vapor. Adjust the vertical position of the apparatus and the water temperature as required to complete the concentration in 15 to 20 min. At the proper rate of distillation the balls of the column will actively chatter but the chambers will not flood with condensed solvent. When the apparent volume of liquid reaches 1 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 min.

10.7 Remove the Snyder column and rinse the flask and its lower joint into the concentrator tube with 1 to 2 mL of methylene chloride. A 5-mL syringe is recommended for this operation. Stopper the concentrator tube and store refrigerated if further processing will not be performed immediately. If the extract will be stored longer than two days, it should be transferred to a Teflon-sealed screw-cap vial and protected from light. If the sample extract requires no further cleanup, proceed with gas or liquid chromatographic analysis (Section 12 or 13). If the sample requires further cleanup, proceed to Section 11.

10.8 Determine the original sample volume by refilling the sample bottle to the mark and transferring the liquid to a 1000-mL graduated cylinder. Record the sample volume to the nearest 5 mL.

11. Cleanup and Separation

11.1 Cleanup procedures may not be necessary for a relatively clean sample matrix. If particular circumstances demand the use of a cleanup procedure, the analyst may use the procedure below or any other appropriate procedure. However, the analyst first must demonstrate that the requirements of Section 8.2 can be met using the methods as revised to incorporate the cleanup procedure.

11.2 Before the silica gel cleanup technique can be utilized, the extract solvent must be exchanged to cyclohexane. Add 1 to 10 mL of the sample extract (in methylene chloride) and a boiling chip to a clean K-D concentrator tube. Add 4 mL of cyclohexane and attach a two-ball micro-Snyder column. Prewet the column by adding 0.5 mL of methylene chloride to the top. Place the micro-K-D apparatus on a boiling (100 °C) water bath so that the concentrator tube is partially immersed in the hot water. Adjust the vertical position of the apparatus and the water temperature as required to complete concentration in 5 to 10 min. At the proper rate of distillation the balls of the column will actively chatter but the chambers will not flood. When the apparent volume of the liquid reaches 0.5 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 min. Remove the micro-Snyder column and rinse its lower joint into the concentrator tube with a minimum amount of cyclohexane. Adjust the extract volume to about 2 mL.

11.3 Silica gel column cleanup for PAHs:

11.3.1 Prepare a slurry of 10 g of activated silica gel in methylene chloride and place this into a 10-mm ID chromatographic column. Tap the column to settle the silica gel and elute the methylene chloride. Add 1 to 2 cm of anhydrous sodium sulfate to the top of the silica gel.

11.3.2 Preelute the column with 40 mL of pentane. The rate for all elutions should be about 2 mL/min. Discard the eluate and just prior to exposure of the sodium sulfate layer to the air, transfer the 2-mL cyclohexane sample extract onto the column using an additional 2 mL cyclohexane to complete the transfer. Just prior to exposure of the sodium sulfate layer to the air, add 25 mL of pentane and continue the elution of the column. Discard this pentane eluate.

11.3.3 Next, elute the column with 25 mL of methylene chloride/pentane (4+6)(V/V) into a 500-mL K-D flask equipped with a 10-mL concentrator tube. Concentrate the collected fraction to less than 10 mL as in Section 10.6. When the apparatus is cool, remove the Snyder column and rinse the flask and its lower joint with pentane. Proceed with HPLC or GC analysis.

12. High Performance Liquid Chromatography

12.1 To the extract in the concentrator tube, add 4 mL of acetonitrile and a new boiling chip, then attach a two-ball micro-Snyder column. Concentrate the solvent as in Section 10.6, except set the water bath at 95 to 100 °C. When the apparatus is cool, remove the micro-Snyder column and rinse its lower joint into the concentrator tube with about 0.2 mL of acetonitrile. Adjust the extract volume to 1.0 mL.

12.2 Table 1 summarizes the recommended operating conditions for the HPLC. Included in this table are retention times, capacity factors, and MDL that can be achieved under these conditions. The UV detector is recommended for the determination of naphthalene, acenaphthylene, acenapthene, and fluorene and the fluorescence detector is recommended for the remaining PAHs. Examples of the separations achieved by this HPLC column are shown in Figures 1 and 2. Other HPLC columns, chromatographic conditions, or detectors may be used if the requirements of Section 8.2 are met.

12.3 Calibrate the system daily as described in Section 7.

12.4 If the internal standard calibration procedure is being used, the internal standard must be added to the sample extract and mixed thoroughly immediately before injection into the instrument.

12.5 Inject 5 to 25 μL of the sample extract or standard into the HPLC using a high pressure syringe or a constant volume sample injection loop. Record the volume injected to the nearest 0.1 μL, and the resulting peak size in area or peak height units. Re-equilibrate the HPLC column at the initial gradient conditions for at least 10 min between injections.

12.6 Identify the parameters in the sample by comparing the retention time of the peaks in the sample chromatogram with those of the peaks in standard chromatograms. The width of the retention time window used to make identifications should be based upon measurements of actual retention time variations of standards over the course of a day. Three times the standard deviation of a retention time for a compound can be used to calculate a suggested window size; however, the experience of the analyst should weigh heavily in the interpretation of chromatograms.

12.7 If the response for a peak exceeds the working range of the system, dilute the extract with acetonitrile and reanalyze.

12.8 If the measurement of the peak response is prevented by the presence of interferences, further cleanup is required.

13. Gas Chromatography

13.1 The packed column GC procedure will not resolve certain isomeric pairs as indicated in Section 1.3 and Table 2. The liquid chromatographic procedure (Section 12) must be used for these parameters.

13.2 To achieve maximum sensitivity with this method, the extract must be concentrated to 1.0 mL. Add a clean boiling chip to the methylene chloride extract in the concentrator tube. Attach a two-ball micro-Snyder column. Prewet the micro-Snyder column by adding about 0.5 mL of methylene chloride to the top. Place the micro-K-D apparatus on a hot water bath (60 to 65 °C) so that the concentrator tube is partially immersed in the hot water. Adjust the vertical position of the apparatus and the water temperature as required to complete the concentration in 5 to 10 min. At the proper rate of distillation the balls will actively chatter but the chambers will not flood. When the apparent volume of liquid reaches 0.5 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 min. Remove the micro-Snyder column and rinse its lower joint into the concentrator tube with a minimum amount of methylene chloride. Adjust the final volume to 1.0 mL and stopper the concentrator tube.

13.3 Table 2 summarizes the recommended operating conditions for the gas chromatograph. Included in this table are retention times that were obtained under these conditions. An example of the separation achieved by this column is shown in Figure 3. Other packed or capillary (open-tubular) columns, chromatographic conditions, or detectors may be used if the requirements of Section 8.2 are met.

13.4 Calibrate the gas chromatographic system daily as described in Section 7.

13.5 If the internal standard calibration procedure is being used, the internal standard must be added to the sample extract and mixed thoroughly immediately before injection into the gas chromatograph.

13.6 Inject 2 to 5 μL of the sample extract or standard into the gas chromatograph using the solvent-flush technique.[11] Smaller (1.0 μL) volumes may be injected if automatic devices are employed. Record the volume injected to the nearest 0.05 μL, and the resulting peak size in area or peak height units.

13.7 Identify the parameters in the sample by comparing the retention times of the peaks in the sample chromatogram with those of the peaks in standard chromatograms. The width of the retention time window used to make identifications should be based upon measurements of actual retention time variations of standards over the course of a day. Three times the standard deviation of a retention time for a compound can be used to calculate a suggested window size; however, the experience of the analyst should weigh heavily in the interpretation of chromatograms.

13.8 If the response for a peak exceeds the working range of the system, dilute the extract and reanalyze.

13.9 If the measurement of the peak response is prevented by the presence of interferences, further cleanup is required.

14. Calculations

14.1 Determine the concentration of individual compounds in the sample.

14.1.1 If the external standard calibration procedure is used, calculate the amount of material injected from the peak response using the calibration curve or calibration factor determined in Section 7.2.2. The concentration in the sample can be calculated from Equation 2.

$$\text{Concentration } (\mu g/L) = \frac{(A)(V_t)}{(V_i)(V_s)}$$

Equation 2

where:

A=Amount of material injected (ng).
V_i=Volume of extract injected (μL).
V_t=Volume of total extract (μL).
V_s=Volume of water extracted (mL).

14.1.2 If the internal standard calibration procedure is used, calculate the concentration in the sample using the response factor (RF) determined in Section 7.3.2 and Equation 3.

$$\text{Concentration } (\mu g/L) = \frac{(A_s)(I_s)}{(A_{is})(RF)(V_o)}$$

Equation 3

where:

A_s=Response for the parameter to be measured.
A_{is}=Response for the internal standard.
I_s=Amount of internal standard added to each extract (μg).
V_o=Volume of water extracted (L).

14.2 Report results in μg/L without correction for recovery data. All QC data obtained should be reported with the sample results.

15. Method Performance

15.1 The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero.[1] The MDL concentrations listed in Table 1 were obtained using reagent water.[11] Similar results were achieved using representative wastewaters. MDL for the GC approach were not determined. The MDL actually achieved in a given analysis will vary depending on instrument sensitivity and matrix effects.

15.2 This method has been tested for linearity of spike recovery from reagent water and has been demonstrated to be applicable ver the concentration range from 8 × MDL o 800 × MDL[11] with the following excepion: benzo(ghi)perylene recovery at 80 × nd 800 × MDL were low (35% and 45%, repectively).

15.3 This method was tested by 16 laboratories using reagent water, drinking water, surface water, and three industrial wastewaters spiked at six concentrations over the range 0.1 to 425 μg/L.[12] Single operator precision, overall precision, and method accuracy were found to be directly related to the concentration of the parameter and essentially independent of the sample matrix. Linear equations to describe these relationships are presented in Table 4.

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TABLE 1.—HIGH PERFORMANCE LIQUID CHROMATOGRAPHY CONDITIONS AND METHOD DETECTION LIMITS

Parameter	Retention time (min)	Column capacity factor (k')	Method detection limit (µg/L) [a]
Naphthalene	16.6	12.2	1.8
Acenaphthylene	18.5	13.7	2.3
Acenaphthene	20.5	15.2	1.8
Fluorene	21.2	15.8	0.21
Phenanthrene	22.1	16.6	0.64
Anthracene	23.4	17.6	0.66
Fluoranthene	24.5	18.5	0.21
Pyrene	25.4	19.1	0.27
Benzo(a)anthracene	28.5	21.6	0.013
Chrysene	29.3	22.2	0.15
Benzo(b)fluoranthene	31.6	24.0	0.018
Benzo(k)fluoranthene	32.9	25.1	0.017
Benzo(a)pyrene	33.9	25.9	0.023
Dibenzo(a,h)anthracene	35.7	27.4	0.030
Benzo(ghi)perylene	36.3	27.8	0.076
Indeno(1,2,3-cd)pyrene	37.4	28.7	0.043

HPLC column conditions: Reverse phase HC-ODS Sil-X, 5 micron particle size, in a 25 cm × 2.6 mm ID stainless steel column. Isocratic elution for 5 min. using acetonitrile/water (4+6), then linear gradient elution to 100% acetonitrile over 25 min. at 0.5 mL/min flow rate. If columns having other internal diameters are used, the flow rate should be adjusted to maintain a linear velocity of 2 mm/sec.

[a] The MDL for naphthalene, acenaphthylene, acenaphthene, and fluorene were determined using a UV detector. All others were determined using a fluorescence detector.

TABLE 2.—GAS CHROMATOGRAPHIC CONDITIONS AND RETENTION TIMES

Parameter	Retention time (min)
Naphthalene	4.5
Acenaphthylene	10.4
Acenaphthene	10.8
Fluorene	12.6
Phenanthrene	15.9
Anthracene	15.9
Fluoranthene	19.8
Pyrene	20.6
Benzo(a)anthracene	24.7
Chrysene	24.7
Benzo(b)fluoranthene	28.0
Benzo(k)fluoranthene	28.0
Benzo(a)pyrene	29.4
Dibenzo(a,h)anthracene	36.2
Indeno(1,2,3-cd)pyrene	36.2
Benzo(ghi)perylene	38.6

GC Column conditions: Chromosorb W-AW-DCMS (100/120 mesh) coated with 3% OV-17 packed in a 1.8 x 2 mm ID glass column with nitrogen carrier gas at 40 mL/min. flow rate. Column temperature was held at 100 °C for 4 min, then programmed at 8 °C/min. to a final hold at 280 °C.

TABLE 3.—QC ACCEPTANCE CRITERIA—METHOD 610

Parameter	Test conc. (µg/L)	Limit for s (µg/L)	Range for $\bar{X}$ (µg/L)	Range for P, P_s (%)
Acenaphthene	100	40.3	D–105.7	D-1
Acenaphthylene	100	45.1	22.1–112.1	D-1
Anthracene	100	28.7	11.2–112.3	D-1
Benzo(a)anthracene	10	4.0	3.1–11.6	12-1
Benzo(a)pyrene	10	4.0	0.2–11.0	D-1
Benzo(b)fluor-anthene	10	3.1	1.8–13.8	6-1

TABLE 3.—QC ACCEPTANCE CRITERIA—METHOD 610—Continued

Parameter	Test conc. (μg/L)	Limit for s (μg/L)	Range for $\bar{X}$ (μg/L)	Range for P, P_s (%)
Benzo(ghi)perylene	10	2.3	D–10.7	D–116
Benzo(k)fluo-ranthene	5	2.5	D–7.0	D–159
Chrysene	10	4.2	D–17.5	D–199
Dibenzo(a,h)an-thracene	10	2.0	0.3–10.0	D–110
Fluoranthene	10	3.0	2.7–11.1	14–123
Fluorene	100	43.0	D–119	D–142
Indeno(1,2,3-cd)pyrene	10	3.0	1.2–10.0	D–116
Naphthalene	100	40.7	21.5–100.0	D–122
Phenanthrene	100	37.7	8.4–133.7	D–155
Pyrene	10	3.4	1.4–12.1	D–140

s=Standard deviation of four recovery measurements, in μg/L (Section 8.2.4).
$\bar{X}$=Average recovery for four recovery measurements, in μg/L (Section 8.2.4).
P, P_s=Percent recovery measured (Section 8.3.2, Section 8.4.2).
D=Detected; result must be greater than zero.

NOTE: These criteria are based directly upon the method performance data in Table 4. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table 4.

TABLE 4.—METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION—METHOD 610

Parameter	Accuracy, as recovery, X' (μg/L)	Single analyst precision, s_r' (μg/L)	Overall precision, S' (μg/L)
Acenaphthene	0.52C+0.54	$0.39\bar{X}+0.76$	$0.53\bar{X}+1.32$
Acenaphthylene	0.69C−1.89	$0.36\bar{X}+0.29$	$0.42\bar{X}+0.52$
Anthracene	0.63C−1.26	$0.23\bar{X}+1.16$	$0.41\bar{X}+0.45$
Benzo(a)anthracene	0.73C+0.05	$0.28\bar{X}+0.04$	$0.34\bar{X}+0.02$
Benzo(a)pyrene	0.56C+0.01	$0.38\bar{X}-0.01$	$0.53\bar{X}-0.01$
Benzo(b)fluoranthene	0.78C+0.01	$0.21\bar{X}+0.01$	$0.38\bar{X}-0.00$
Benzo(ghi)perylene	0.44C+0.30	$0.25\bar{X}+0.04$	$0.58\bar{X}+0.10$
Benzo(k)fluoranthene	0.59C+0.00	$0.44\bar{X}-0.00$	$0.69\bar{X}+0.01$
Chrysene	0.77C−0.18	$0.32\bar{X}-0.18$	$0.66\bar{X}-0.22$
Dibenzo(a,h)anthracene	0.41C+0.11	$0.24\bar{X}+0.02$	$0.45\bar{X}+0.03$
Fluoranthene	0.68C+0.07	$0.22\bar{X}+0.06$	$0.32\bar{X}+0.03$
Fluorene	0.56C−0.52	$0.44\bar{X}-1.12$	$0.63\bar{X}-0.65$
Indeno(1,2,3-cd)pyrene	0.54C+0.06	$0.29\bar{X}+0.02$	$0.42\bar{X}+0.01$
Naphthalene	0.57C−0.70	$0.39\bar{X}-0.18$	$0.41\bar{X}+0.74$
Phenanthrene	0.72C−0.95	$0.29\bar{X}+0.05$	$0.47\bar{X}-0.25$
Pyrene	0.69C−0.12	$0.25\bar{X}+0.14$	$0.42\bar{X}-0.00$

X'=Expected recovery for one or more measurements of a sample containing a concentration of C, in μg/L.
s_r'=Expected single analyst standard deviation of measurements at an average concentration found of $\bar{X}$, in μg/L.
S'=Expected interlaboratory standard deviation of measurements at an average concentration found of $\bar{X}$, in μg/L.
C=True value for the concentration, in μg/L.
$\bar{X}$=Average recovery found for measurements of samples containing a concentration of C, in μg/L.

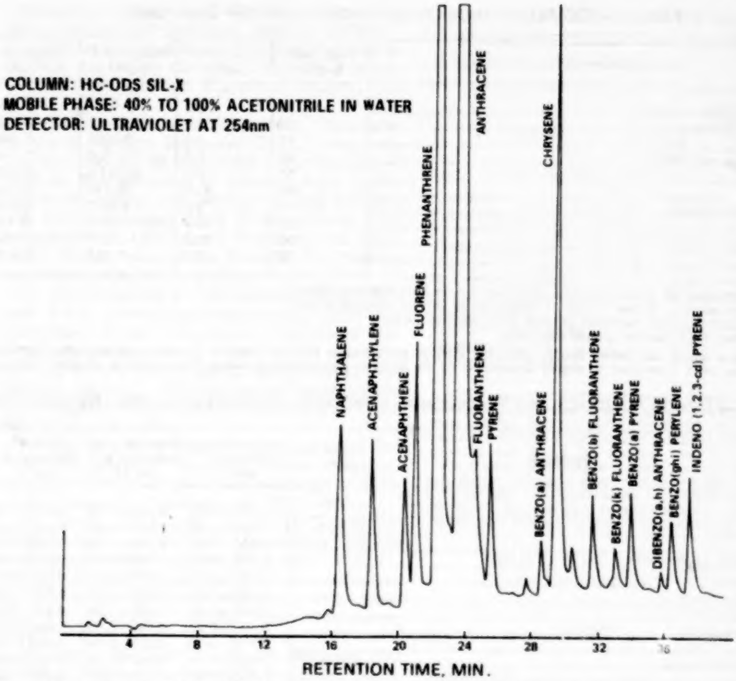

Figure 1. Liquid chromatogram of polynuclear aromatic hydrocarbons.

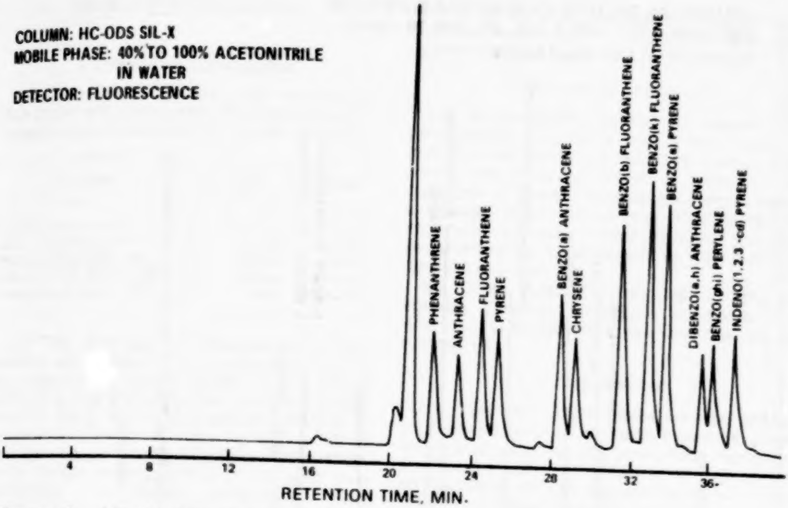

Figure 2. **Liquid chromatogram of polynuclear aromatic hydrocarbons.**

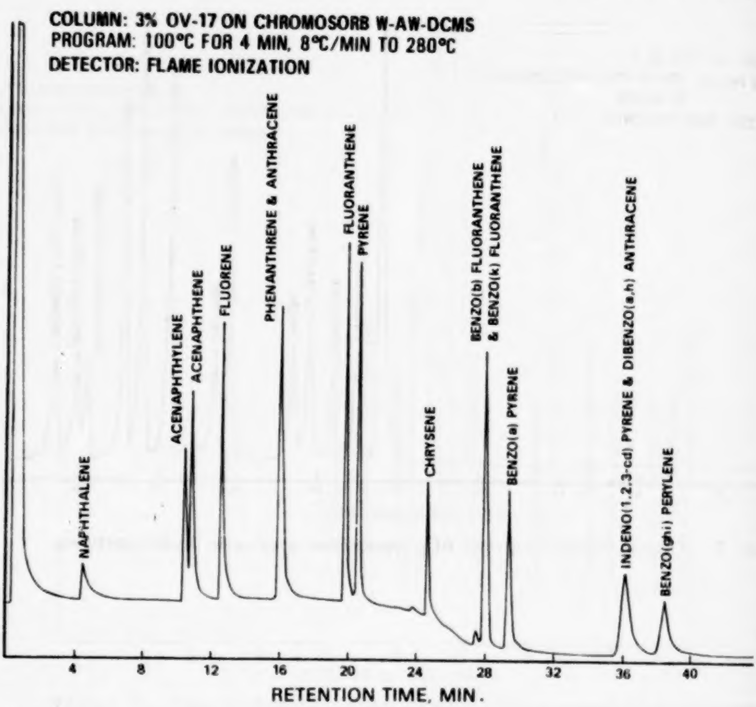

Figure 3. Gas chromatogram of polynuclear aromatic hydrocarbons

METHOD 611—HALOETHERS

1. Scope and Application

1.1 This method covers the determination of certain haloethers. The following parameters can be determined by this method:

Parameter	STORET No.	CAS No.
Bis(2-chloroethyl) ether	34273	111–44–4
Bis(2-chloroethoxy) methane	34278	111–91–1
Bis(2-chloroisopropyl) ether	34283	108–60–1
4-Bromophenyl phenyl ether	34636	101–55–3
4-Chlorophenyl phenyl either	34641	7005–72–3

1.2 This is a gas chromatographic (GC) method applicable to the determination of the compounds listed above in municipal and industrial discharges as provided under 40 CFR 136.1. When this method is used to analyze unfamiliar samples for any or all of the compounds above, compound identifications should be supported by at least one additional qualitative technique. This method describes analytical conditions for a second gas chromatographic column that can be used to confirm measurements made with the primary column. Method 625 provides gas chromatograph/mass spectrometer (GC/MS) conditions appropriate for the qualitative and quantitative confirmation of results for all of the parameters listed above, using the extract produced by this method.

1.3 The method detection limit (MDL, defined in Section 14.1)[1] for each parameter is listed in Table 1. The MDL for a specific wastewater may differ from those listed, depending upon the nature of interferences in the sample matrix.

1.4 The sample extraction and concentration steps in this method are essentially the same as in Methods 606, 608, 609, and 612. Thus, a single sample may be extracted to measure the parameters included in the scope of each of these methods. When cleanup is required, the concentration levels must be high enough to permit selecting aliquots, as necessary, to apply appropriate cleanup procedures. The analyst is allowed the latitude, under Section 12, to select chromatographic conditions appropriate for the simultaneous measurement of combinations of these parameters.

1.5 Any modification of this method, beyond those expressly permitted, shall be considered as a major modification subject to application and approval of alternate test procedures under 40 CFR 136.4 and 136.5.

1.6 This method is restricted to use by or under the supervision of analysts experienced in the use of a gas chromatograph and in the interpretation of gas chromatograms. Each analyst must demonstrate the ability to generate acceptable results with this method using the procedure described in Section 8.2.

2. Summary of Method

2.1 A measured volume of sample, approximately 1-L, is extracted with methylene chloride using a separatory funnel. The methylene chloride extract is dried and exchanged to hexane during concentration to a volume of 10 mL or less. The extract is separated by gas chromatography and the parameters are then measured with a halide specific detector.[2]

2.2 The method provides a Florisil column cleanup procedure to aid in the elimination of interferences that may be encountered.

3. Interferences

3.1 Method interferences may be caused by contaminants in solvents, reagents, glassware, and other sample processing hardware that lead to discrete artifacts and/or elevated baselines in gas chromatograms. All of these materials must be routinely demonstrated to be free from interferences under the conditions of the analysis by running laboratory reagent blanks as described in Section 8.1.3.

3.1.1 Glassware must be scrupulously cleaned.[3] Clean all glassware as soon as possible after use by rinsing with the last solvent used in it. Solvent rinsing should be followed be detergent washing with hot water, and rinses with tap water and distilled water. The glassware should then be drained dry, and heated in a muffle furnace at 400 °C for 15 to 30 min. Some thermally stable materials, such a PCBs, may not be eliminated by this treatment. Solvent rinses with acetone and pesticide quality hexane may be substituted for the muffle furnace heating. Thorough rinsing with such solvents usually eliminates PCB interference. Volumetric ware should not be heated in a muffle furnace. After drying and cooling, glassware should be sealed and stored in a clean environment to prevent any accumulation of dust or other contaminants. Store inverted or capped with aluminum foil.

3.1.2 The use of high purity reagents and solvents helps to minimize interference problems. Purification of solvents by distillation in all-glass systems may be required.

3.2 Matrix interferences may be caused by contaminants that are co-extracted from the sample. The extent of matrix interferences will vary considerably from source to source, depending upon the nature and diversity of the industrial complex or municipality being sampled. The cleanup procedure in Section 11 can be used to overcome many of these interferences, but unique samples may require additional cleanup approaches to achieve the MDL listed in Table 1.

3.3 Dichlorobenzenes are known to coelute with haloethers under some gas chromatographic conditions. If these materials are present together in a sample, it may be necessary to analyze the extract with two different column packings to completely resolve all of the compounds.

4. Safety

4.1 The toxicity or carcinogenicity of each reagent used in this method has not been precisely defined; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material data handling sheets should also be made available to all personnel involved in the chemical analysis. Additional references to laboratory safety are available and have been identified [4-6] for the information of the analyst.

5. Apparatus and Materials

5.1 Sampling equipment, for discrete or composite sampling.

5.1.1 Grab sample bottle—1-L or 1-qt, amber glass, fitted with a screw cap lined with Teflon. Foil may be substituted for Teflon if the sample is not corrosive. If amber bottles are not available, protect samples from light. The bottle and cap liner must be washed, rinsed with acetone or methylene chloride, and dried before use to minimize contamination.

5.1.2 Automatic sampler (optional)—The sampler must incorporate glass sample containers for the collection of a minimum of 250 mL of sample. Sample containers must be kept refrigerated at 4 °C and protected from light during compositing. If the sampler uses a peristaltic pump, a minimum length of compressible silicone rubber tubing may be used. Before use, however, the compressible tubing should be thoroughly rinsed with methanol, followed by repeated rinsings with distilled water to minimize the potential for contamination of the sample. An integrating flow meter is required to collect flow proportional composites.

5.2 Glassware (All specifications are suggested. Catalog numbers are included for illustration only.):

5.2.1 Separatory funnel—2-L, with Teflon stopcock.

5.2.2 Drying column—Chromatographic column, approximately 400 mm long x 19 mm ID, with coarse frit filter disc.

5.2.3 Chromatographic column—400 m long x 19 mm ID, with Teflon stopcock a coarse frit filter disc at bottom (Kontes 420540-0224 or equivalent).

5.2.4 Concentrator tube, Kudern Danish—10-mL, graduated (Kontes 570050-1025 or equivalent). Calibratio must be checked at the volumes employe in the test. Ground glass stopper is used prevent evaporation of extracts.

5.2.5 Evaporative flask, Kudern Danish—500-mL (Kontes K-570001-0500 equivalent). Attach to concentrator tu with springs.

5.2.6 Snyder column, Kuderna-Danish Three-ball macro (Kontes K-503000-0121 equivalent).

5.2.7 Vials—10 to 15-mL, amber gla with Teflon-lined screw cap.

5.3 Boiling chips—Approximately 10/ mesh. Heat to 400 °C for 30 min or Soxhl extract with methylene chloride.

5.4 Water bath—Heated, with concentr ring cover, capable of temperature contr (±2°C). The bath should be used in a hoo

5.5 Balance—Analytical, capable of acc rately weighing 0.0001 g.

5.6 Gas chromatograph—An analytic system complete with temperature progra mable gas chromatograph suitable for column injection and all required access ries including syringes, analytical colum gases, detector, and strip-chart recorder. data system is recommended for measurin peak areas.

5.6.1 Column 1—1.8 m long x 2 mm glass, packed with 3% SP-1000 on Supelc port (100/120 mesh) or equivalent. Th column was used to develop the method pe formance statements in Section 14. Guid lines for the use of alternate column pac ings are provided in Section 12.1.

5.6.2 Column 2—1.8 m long x 2 mm glass, packed with 2,6-diphenylene oxi polymer (60/80 mesh), Tenax, or equivale

5.6.3 Detector—Halide specific detecto electrolytic conductivity or microcoulom tric. These detectors have proven effecti in the analysis of wastewaters for the p rameters listed in the scope (Section 1. The Hall conductivity detector was used develop the method performance sta ments in Section 14. Guidelines for the of alternate detectors are provided in Se tion 12.1. Although less selective, an el tron capture detector is an acceptable al native.

6. Reagents

6.1 Reagent water—Reagent water is fined as a water in which an interferent not observed at the MDL of the parame of interest.

6.2 Sodium thiosulfate—(ACS) Granul

6.3 Acetone, hexane, methanol, methylene chloride, petroleum ether (boiling range 30–60 °C)—Pesticide quality or equivalent.

6.4 Sodium sulfate—(ACS) Granular, anhydrous. Purify by heating at 400 °C for 4 h in a shallow tray.

6.5 Florisil—PR Grade (60/100 mesh). Purchase activated at 1250 °F and store in the dark in glass containers with ground glass stoppers or foil-lined screw caps. Before use, activate each batch at least 16 h at 130 °C in a foil-covered glass container and allow to cool.

6.6 Ethyl ether—Nanograde, redistilled in glass if necessary.

6.6.1 Ethyl ether must be shown to be free of peroxides before it is used as indicated by EM Laboratories Quant test strips. (Available from Scientific Products Co., Cat. No. P1126-8, and other suppliers.)

6.6.2 Procedures recommended for removal of peroxides are provided with the test strips. After cleanup, 20 mL of ethyl alcohol preservative must be added to each liter of ether.

6.7 Stock standard solutions (1.00 μg/μL)—Stock standard solutions can be prepared from pure standard materials or purchased as certified solutions.

6.7.1 Prepare stock standard solutions by accurately weighing about 0.0100 g of pure material. Dissolve the material in acetone and dilute to volume in a 10-mL volumetric flask. Larger volumes can be used at the convenience of the analyst. When compound purity is assayed to be 96% or greater, the weight can be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards can be used at any concentration if they are certified by the manufacturer or by an independent source.

6.7.2 Transfer the stock standard solutions into Teflon-sealed screw-cap bottles. Store at 4 °C and protect from light. Stock standard solutions should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

6.7.3 Stock standard solutions must be replaced after six months, or sooner if comparison with check standards indicates a problem.

6.8 Quality control check sample concentrate—See Section 8.2.1.

7. Calibration

7.1 Establish gas chromatographic operating conditions equivalent to those given in Table 1. The gas chromatographic system can be calibrated using the external standard technique (Section 7.2) or the internal standard technique (Section 7.3).

7.2 External standard calibration procedure:

7.2.1 Prepare calibration standards at a minimum of three concentration levels for each parameter of interest by adding volumes of one or more stock standards to a volumetric flask and diluting to volume with hexane. One of the external standards should be at a concentration near, but above, the MDL (Table 1) and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the detector.

7.2.2 Using injections of 2 to 5 μL, analyze each calibration standard according to Section 12 and tabulate peak height or area responses against the mass injected. The results can be used to prepare a calibration curve for each compound. Alternatively, if the ratio of response to amount injected (calibration factor) is a constant over the working range (<10% relative standard deviation, RSD), linearity through the origin can be assumed and the average ratio or calibration factor can be used in place of a calibration curve.

7.3 Internal standard calibration procedure—To use this approach, the analyst must select one or more internal standards that are similar in analytical behavior to the compounds of interest. The analyst must further demonstrate that the measurement of the internal standard is not affected by method or matrix interferences. Because of these limitations, no internal standard can be suggested that is applicable to all samples.

7.3.1 Prepare calibration standards at a minimum of three concentration levels for each parameter of interest by adding volumes of one or more stock standards to a volumetric flask. To each calibration standard, add a known constant amount of one or more internal standards, and dilute to volume with hexane. One of the standards should be at a concentration near, but above, the MDL and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the detector.

7.3.2 Using injections of 2 to 5 μL, analyze each calibration standard according to Section 12 and tabulate peak height or area responses against concentration for each compound and internal standard. Calculate response factors (RF) for each compound using Equation 1.

$$RF = \frac{(A_s)(C_{is})}{(A_{is})(C_s)}$$

Equation 1

where:

A_s=Response for the parameter to be measured.

A_{is}=Response for the internal standard.

C_{is}=Concentration of the internal standard (µg/L).

C_s=Concentration of the parameter to be measured (µg/L).

If the RF value over the working range is a constant (< 10% RSD), the RF can be assumed to be invariant and the average RF can be used for calculations. Alternatively, the results can be used to plot a calibration curve of response ratios, A_s/A_{is}, vs. RF.

7.4 The working calibration curve, calibration factor, or RF must be verified on each working day by the measurement of one or more calibration standards. If the response for any parameter varies from the predicted response by more than ±15%, a new calibration curve must be prepared for that compound.

7.5 The cleanup procedure in Section 11 utilizes Florisil column chromatography. Florisil from different batches or sources may vary in adsorptive capacity. To standardize the amount of Florisil which is used, the use of lauric acid value[7] is suggested. The referenced procedure determines the adsorption from hexane solution of lauric acid (mg) per g of Florisil. The amount of Florisil to be used for each column is calculated by dividing 110 by this ratio and multiplying by 20 g.

7.6. Before using any cleanup procedure, the analyst must process a series of calibration standards through the procedure to validate elution patterns and the absence of interferences from the reagents.

8. Quality Control

8.1 Each laboratory that uses this method is required to operate a formal quality control program. The minimum requirements of this program consist of an initial demonstration of laboratory capability and an ongoing analysis of spiked samples to evaluate and document data quality. The laboratory must maintain records to document the quality of data that is generated. Ongoing data quality checks are compared with established performance criteria to determine if the results of analyses meet the performance characteristics of the method. When results of sample spikes indicate atypical method performance, a quality control check standard must be analyzed to confirm that the measurements were performed in an in-control mode of operation.

8.1.1 The analyst must make an initial, one-time, demonstration of the ability to generate acceptable accuracy and precision with this method. This ability is established as described in Section 8.2.

8.1.2 In recognition of advances that are occurring in chromatography, the analyst is permitted certain options (detailed in Sections 10.4, 11.1, and 12.1) to improve the separations or lower the cost of measurements. Each time such a modification is made to the method, the analyst is required to repeat the procedure in Section 8.2.

8.1.3 Before processing any samples, the analyst must analyze a reagent water blank to demonstrate that interferences from the analytical system and glassware are under control. Each time a set of samples is extracted or reagents are changed, a reagent water blank must be processed as a safeguard against laboratory contamination.

8.1.4 The laboratory must, on an ongoing basis, spike and analyze a minimum of 10% of all samples to monitor and evaluate laboratory data quality. This procedure is described in Section 8.3.

8.1.5 The laboratory must, on an ongoing basis, demonstrate through the analyses of quality control check standards that the operation of the measurement system is in control. This procedure is described in Section 8.4. The frequency of the check standard analyses is equivalent to 10% of all samples analyzed but may be reduced if spike recoveries from samples (Section 8.3) meet all specified quality control criteria.

8.1.6 The laboratory must maintain performance records to document the quality of data that is generated. This procedure is described in Section 8.5.

8.2 To establish the ability to generate acceptable accuracy and precision, the analyst must perform the following operations.

8.2.1 A quality control (QC) check sample concentrate is required containing each parameter of interest at a concentration of 100 µg/mL in acetone. The QC check sample concentrate must be obtained from the U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory in Cincinnati, Ohio, if available. If not available from that source, the QC check sample concentrate must be obtained from another external source. If not available from either source above, the QC check sample concentrate must be prepared by the laboratory using stock standards prepared independently from those used for calibration.

8.2.2 Using a pipet, prepare QC check samples at a concentration of 100 µg/L by adding 1.00 mL of QC check sample concentrate to each of four 1-L aliquots of reagent water.

8.2.3 Analyze the well-mixed QC check samples according to the method beginning in Section 10.

8.2.4 Calculate the average recovery ($\bar{X}$) in µg/L, and the standard deviation of the recovery (s) in µg/L, for each parameter using the four results.

8.2.5 For each parameter compare s and $\bar{X}$ with the corresponding acceptance criteria for precision and accuracy, respectively, found in Table 2. If s and $\bar{X}$ for all parameters of interest meet the acceptance criteria, the system performance is acceptable and analysis of actual samples can begin. If any individual s exceeds the precision limit or any individual $\bar{X}$ falls outside the range for accuracy, the system performance is unacceptable for that parameter. Locate and correct the source of the problem and repeat the test for all parameters of interest beginning with Section 8.2.2.

8.3 The laboratory must, on an ongoing basis, spike at least 10% of the samples from each sample site being monitored to assess accuracy. For laboratories analyzing one to ten samples per month, at least one spiked sample per month is required.

8.3.1. The concentration of the spike in the sample should be determined as follows:

8.3.1.1 If, as in compliance monitoring, the concentration of a specific parameter in the sample is being checked against a regulatory concentration limit, the spike should be at that limit or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.2 If the concentration of a specific parameter in the sample is not being checked against a limit specific to that parameter, the spike should be at 100 μg/L or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.3 If it is impractical to determine background levels before spiking (e.g., maximum holding times will be exceeded), the spike concentration should be (1) the regulatory concentration limit, if any; or, if none (2) the larger of either 5 times higher than the expected background concentration or 100 μg/L.

8.3.2 Analyze one sample aliquot to de-ermine the background concentration (B) f each parameter. If necessary, prepare a ew QC check sample concentrate (Section .2.1) appropriate for the background con-entrations in the sample. Spike a second ample aliquot with 1.0 mL of the QC check ample concentrate and analyze it to deter-aine the concentration after spiking (A) of ach parameter. Calculate each percent re-overy (P) as 100(A-B)%/T, where T is the nown true value of the spike.

8.3.3 Compare the percent recovery (P) r each parameter with the corresponding C acceptance criteria found in Table 2. hese acceptance criteria were calculated to clude an allowance for error in measure-ent of both the background and spike con-ntrations, assuming a spike to background tio of 5:1. This error will be accounted for the extent that the analyst's spike to ckground ratio approaches 5:1.[8] If spiking s performed at a concentration lower an 100 μg/L, the analyst must use either e QC acceptance criteria in Table 2, or op-nal QC acceptance criteria calculated for the specific spike concentration. To calculate optional acceptance criteria for the recovery of a parameter: (1) Calculate accuracy (X') using the equation in Table 3, substituting the spike concentration (T) for C; (2) calculate overall precision (S') using the equation in Table 3, substituting X' for $\bar{X}$; (3) calculate the range for recovery at the spike concentration as (100 X'/T)±2.44(100 S'/T)%.[8]

8.3.4 If any individual P falls outside the designated range for recovery, that parameter has failed the acceptance criteria. A check standard containing each parameter that failed the criteria must be analyzed as described in Section 8.4.

8.4 If any parameter fails the acceptance criteria for recovery in Section 8.3, a QC check standard containing each parameter that failed must be prepared and analyzed.

NOTE: The frequency for the required analysis of a QC check standard will depend upon the number of parameters being simultaneously tested, the complexity of the sample matrix, and the performance of the laboratory.

8.4.1 Prepare the QC check standard by adding 1.0 m/L of QC check sample concentrate (Section 8.2.1 or 8.3.2) to 1 L of reagent water. The QC check standard needs only to contain the parameters that failed criteria in the test in Section 8.3.

8.4.2 Analyze the QC check standard to determine the concentration measured (A) of each parameter. Calculate each percent recovery (P_s) as 100 (A/T)%, where T is the true value of the standard concentration.

8.4.3 Compare the percent recovery (P_s) for each parameter with the corresponding QC acceptance criteria found in Table 2. Only parameters that failed the test in Section 8.3 need to be compared with these criteria. If the recovery of any such parameter falls outside the designated range, the laboratory performance for that parameter is judged to be out of control, and the problem must be immediately identified and corrected. The analytical result for that parameter in the unspiked sample is suspect and may not be reported for regulatory compliance purposes.

8.5 As part of the QC program for the laboratory, method accuracy for wastewater samples must be assessed and records must be maintained. After the analysis of five spiked wastewater samples as in Section 8.3, calculate the average percent recovery ($\bar{P}$) and the standard deviation of the percent recovery (s_p). Express the accuracy assessment as a percent recovery interval from $\bar{P}-2s_p$ to $\bar{P}+2s_p$. If $\bar{P}=90\%$ and $s_p=10\%$, for example, the accuracy interval is expressed as 70-110%. Update the accuracy assessment for each parameter on a regular basis (e.g.

after each five to ten new accuracy measurements).

8.6 It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Field duplicates may be analyzed to assess the precision of the environmental measurements. When doubt exists over the identification of a peak on the chromatogram, confirmatory techniques such as gas chromatography with a dissimilar column, specific element detector, or mass spectrometer must be used. Whenever possible, the laboratory should analyze standard reference materials and participate in relevant performance evaluation studies.

9. Sample Collection, Preservation, and Handling

9.1 Grab samples must be collected in glass containers. Conventional sampling practices[9] should be followed, except that the bottle must not be prerinsed with sample before collection. Composite samples should be collected in refrigerated glass containers in accordance with the requirements of the program. Automatic sampling equipment must be as free as possible of Tygon tubing and other potential sources of contamination.

9.2 All samples must be iced or refrigerated at 4°C from the time of collection until extraction. Fill the sample bottles and, if residual chlorine is present, add 80 mg of sodium thiosulfate per liter of sample and mix well. EPA Methods 330.4 and 330.5 may be used for measurement of residual chlorine.[10] Field test kits are available for this purpose.

9.3 All samples must be extracted within 7 days of collection and completely analyzed within 40 days of extraction.[2]

10. Sample Extraction

10.1 Mark the water meniscus on the side of the sample bottle for later determination of sample volume. Pour the entire sample into a 2-L separatory funnel.

10.2 Add 60 mL methylene chloride to the sample bottle, seal, and shake 30 s to rinse the inner surface. Transfer the solvent to the separatory funnel and extract the sample by shaking the funnel for 2 min with periodic venting to release excess pressure. Allow the organic layer to separate from the water phase for a minimum of 10 min. If the emulsion interface between layers is more than one-third the volume of the solvent layer, the analyst must employ mechanical techniques to complete the phase separation. The optimum technique depends upon the sample, but may include stirring, filtration of the emulsion through glass wool, centrifugation, or other physical methods. Collect the methylene chloride extract in a 250-mL Erlenmeyer flask.

10.3 Add a second 60-mL volume of methylene chloride to the sample bottle and repeat the extraction procedure a second time, combining the extracts in the Erlenmeyer flask. Perform a third extraction in the same manner.

10.4 Assemble a Kuderna-Danish (K-D) concentrator by attaching a 10-mL concentrator tube to a 500-mL evaporative flask. Other concentration devices or techniques may be used in place of the K-D concentrator if the requirements of Section 8.2 are met.

10.5 Pour the combined extract through a solvent-rinsed drying column containing about 10 cm of anhydrous sodium sulfate, and collect the extract in the K-D concentrator. Rinse the Erlenmeyer flask and column with 20 to 30 mL of methylene chloride to complete the quantitative transfer.

10.6 Add one or two clean boiling chips to the evaporative flask and attach a three-ball Snyder column. Prewet the Snyder column by adding about 1 mL of methylene chloride to the top. Place the K-D apparatus on a hot water bath (60 to 65 °C) so that the concentrator tube is partially immersed in the hot water, and the entire lower rounded surface of the flask is bathed with hot vapor. Adjust the vertical position of the apparatus and the water temperature as required to complete the concentration in 15 to 20 min. At the proper rate of distillation the balls of the column will actively chatter but the chambers will not flood with condensed solvent. When the apparent volume of liquid reaches 1 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 min.

NOTE: Some of the haloethers are very volatile and significant losses will occur in concentration steps if care is not exercised. It is important to maintain a constant, gentle evaporation rate and not to allow the liquid volume to fall below 1 to 2 mL before removing the K-D apparatus from the hot water bath.

10.7 Momentarily remove the Snyder column, add 50 mL of hexane and a new boiling chip, and reattach the Snyder column. Raise the temperature of the water bath to 85 to 90 °C. Concentrate the extract as in Section 10.6, except use hexane to prewet the column. The elapsed time of concentration should be 5 to 10 min.

10.8 Remove the Snyder column and rinse the flask and its lower joint into the concentrator tube with 1 to 2 mL of hexane. A 5-mL syringe is recommended for this operation. Stopper the concentrator tube and store refrigerated if further processing will not be performed immediately. If the tract will be stored longer than two days, it should be transferred to a Teflon-sealed screw-cap vial. If the sample extract requires no further cleanup, proceed with gas chromatographic analysis (Section 12). If the sample requires further cleanup, proceed to Section 11.

10.9 Determine the original sample volume by refilling the sample bottle to the mark and transferring the liquid to a 1000-mL graduated cylinder. Record the sample volume to the nearest 5 mL.

11. Cleanup and Separation

11.1 Cleanup procedures may not be necessary for a relatively clean sample matrix. If particular circumstances demand the use of a cleanup procedure, the analyst may use the procedure below or any other appropriate procedure. However, the analyst first must demonstrate that the requirements of Section 8.2 can be met using the method as revised to incorporate the cleanup procedure.

11.2 Florisil column cleanup for ha-
loethers:

11.2.1 Adjust the sample extract volume
to 10 mL.

11.2.2 Place a weight of Florisil (nominal-
y 20 g) predetermined by calibration (Sec-
ion 7.5), into a chromatographic column.
Tap the column to settle the Florisil and
dd 1 to 2 cm of anhydrous sodium sulfate
o the top.

11.2.3 Preelute the column with 50 to 60
nL of petroleum ether. Discard the eluate
nd just prior to exposure of the sodium
ulfate layer to the air, quantitatively trans-
er the sample extract onto the column by
ecantation and subsequent petroleum
ther washings. Discard the eluate. Just
rior to exposure of the sodium sulfate
yer to the air, begin eluting the column
ith 300 mL of ethyl ether/petroleum ether
+94) (V/V). Adjust the elution rate to ap-
roximately 5 mL/min and collect the
uate in a 500-mL K-D flask equipped with
10-mL concentrator tube. This fraction
ould contain all of the haloethers.

11.2.4 Concentrate the fraction as in Sec-
n 10.6, except use hexane to prewet the
lumn. When the apparatus is cool, remove
e Snyder column and rinse the flask and
lower joint into the concentrator tube
h hexane. Adjust the volume of the
aned up extract to 10 mL with hexane
d analyze by gas chromatography (Sec-
n 12).

12. Gas Chromatography

2.1 Table 1 summarizes the recommend-
operating conditions for the gas chro-
tograph. Included in this table are reten-
n times and MDL that can be achieved
ler these conditions. Examples of the
arations achieved by Columns 1 and 2 are shown in Figures 1 and 2, respectively. Other packed or capillary (open-tubular) columns, chromatographic conditions, or detectors may be used if the requirements of Section 8.2 are met.

12.2 Calibrate the system daily as described in Section 7.

12.3 If the internal standard calibration procedure is being used, the internal standard must be added to the sample extract and mixed thoroughly immediately before injection into the gas chromatrograph.

12.4 Inject 2 to 5 μL of the sample extract or standard into the gas chromatograph using the solvent-flush technique.[11] Smaller (1.0 μL) volumes may be injected if automatic devices are employed. Record the volume injected to the nearest 0.05 μL, the total extract volume, and the resulting peak size in area or peak height units.

12.5 Identify the parameters in the sample by comparing the retention times of the peaks in the sample chromatogram with those of the peaks in standard chromatograms. The width of the retention time window used to make identifications should be based upon measurements of actual retention time variations of standards over the course of a day. Three times the standard deviation of a retention time for a compound can be used to calculate a suggested window size; however, the experience of the analyst should weight heavily in the interpretation of chromatograms.

12.6 If the response for a peak exceeds the working range of the system, dilute the extract and reanalyze.

12.7 If the measurement of the peak response is prevented by the presence of interferences, further cleanup is required.

13. Calculations

13.1 Determine the concentration of individual compounds in the sample.

13.1.1 If the external standard calibration procedure is used, calculate the amount of material injected from the peak response using the calibration curve or calibration factor determined in Section 7.2.2. The concentration in the sample can be calculated from Equation 2.

$$\text{Concentration } (\mu g/L) = \frac{(A)(V_t)}{(V_i)(V_s)}$$

Equation 2

where:

A = Amount of material injected (ng).
V_i = Volume of extract injected (μL).
V_t = Volume of total extract (μL).
V_s = Volume of water extracted (mL).

13.1.2 If the internal standard calibration procedure is used, calculate the concentration in the sample using the response factor (RF) determined in Section 7.3.2 and Equation 3.

$$\text{Concentration } (\mu g/L) = \frac{(A_s)(I_s)}{(A_{is})(RF)(V_o)}$$

Equation 3

where:

A_s=Response for the parameter to be measured.

A_{is}=Response for the internal standard.

I_s=Amount of internal standard added to each extract (μg).

V_o=Volume of water extracted (L).

13.2 Report results in μg/L without correction for recovery data. All QC data obtained should be reported with the sample results.

14. Method Performance

14.1 The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero.[1] The MDL concentrations listed in Table 1 were obtained using reagent water.[13] Similar results were achieved using representative wastewaters. The MDL actually achieved in a given analysis will vary depending on instrument sensitivity and matrix effects.

14.2 This method has been tested for linearity of spike recovery from reagent water and has been demonstrated to be applicable over the concentration range from 4 × MDL to 1000 × MDL.[13]

14.3 This method was tested by 20 laboratories using reagent water, drinking water, surface water, and three industrial wastewaters spiked at six concentrations over the range 1.0 to 626 μ/L.[12] Single operator precision, overall precision, and method accuracy were found to be directly related to the concentration of the parameter and essentially independent of the sample matrix. Linear equations to describe these relationships are presented in Table 3.

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TABLE 1.—CHROMATOGRAPHIC CONDITIONS AND METHODS DETECTION LIMITS

Parameters	Retention time (min)		Method detection limit (μ/L)
	Column 1	Column 2	
Bis(2-chloroisopropyl) ether	8.4	9.7	0.8
Bis(2-chloroethyl) ether	9.3	9.1	0.3
Bis(2-chloroethoxy) methane	13.1	10.0	0.5
4-Chlorophenyl ether	19.4	15.0	3.9
4-Bromophenyl phenyl ether	21.2	16.2	2.3

Column 1 conditions: Supelcoport (100/120 mesh) coated with 3% SP-1000 packed in a 1.8 m long x 2 mm ID glass column with helium carrier gas at 40 mL/min. flow rate. Column temperature held at 60 °C for 2 min. after injection then programmed at 8 ° C/min. to 230 °C and held for 4 min. Under these conditions the retention time for Aldrin is 22.6 min.

Column 2 conditions: Tenax-GC (60/80 mesh) packed in a 1.8 m long x 2mm ID glass column with helium carrier gas at 40 mL/min. flow rate. Column temperature held at 150 °C for 4 min. after injection then programmed at 16 °C/min. to 310 °C. Under these conditions the retention time for Aldrin is 18.4 min.

TABLE 2.—QC ACCEPTANCE CRITERIA—METHOD 611

Parameter	Test conc. (μg/L)	Limit for s (μg/L)	Range for $\bar{X}$ (μg/L)	Range for P, P_s percent
Bis (2-chloroethyl)ether	100	26.3	26.3–136.8	11–152
Bis (2-chloroethoxy)methane	100	25.7	27.3–115.0	12–128
Bis (2-chloroisopropyl)ether	100	32.7	26.4–147.0	9–165
4-Bromophenyl phenyl ether	100	39.3	7.6 –167.5	D–189
4-Chlorophenyl phenyl ether	100	30.7	15.4–152.5	D–170

s=Standard deviation of four recovery measurements, in μg/L (Section 8.2.4).
$\bar{X}$=Average recovery for four recovery measurements, in μg/L (Section 8.2.4).
P, P_s=Percent recovery measured (Section 8.3.2, Section 8.4.2).
D=Detected; result must be greater than zero.

NOTE: These criteria are based directly upon the method performance data in Table 3. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table 3.

TABLE 3.—METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION—METHOD 611

Parameter	Accuracy, as recovery, X′ (μg/L)	Single analyst precision, s_r' (μg/L)	Overall precision, S′ (μg/L)
Bis(2-chloroethyl) ether	0.81C+0.54	$0.19\bar{X}+0.28$	$0.35\bar{X}+0.36$
Bis(2-chloroethoxy) methane	0.71C+0.13	$0.20\bar{X}+0.15$	$0.33\bar{X}+0.11$
Bis(2-chloroisopropyl) ether	0.85C+1.67	$0.20\bar{X}+1.05$	$0.36\bar{X}+0.79$
4-Bromophenyl phenyl ether	0.85C+2.55	$0.25\bar{X}+0.21$	$0.47\bar{X}+0.37$
4-Chlorophenyl phenyl ether	0.82C+1.97	$0.18\bar{X}+2.13$	$0.41\bar{X}+0.55$

X′ = Expected recovery for one or more measuremeits of a sample containing a concentration of C, in μg/L.
s_r' = Expected single analyst standard deviation of measurements at an average concentration found of $\bar{X}$, in μg/L.
S′ = Expected interlaboratory standard deviation of measurements at an average concentration found of $\bar{X}$, in μg/L.
C =True value for the concentration, in μg/L.
$\bar{X}$ = Average recovery found for measurements of samples containing a concentration of C, in μg/L.

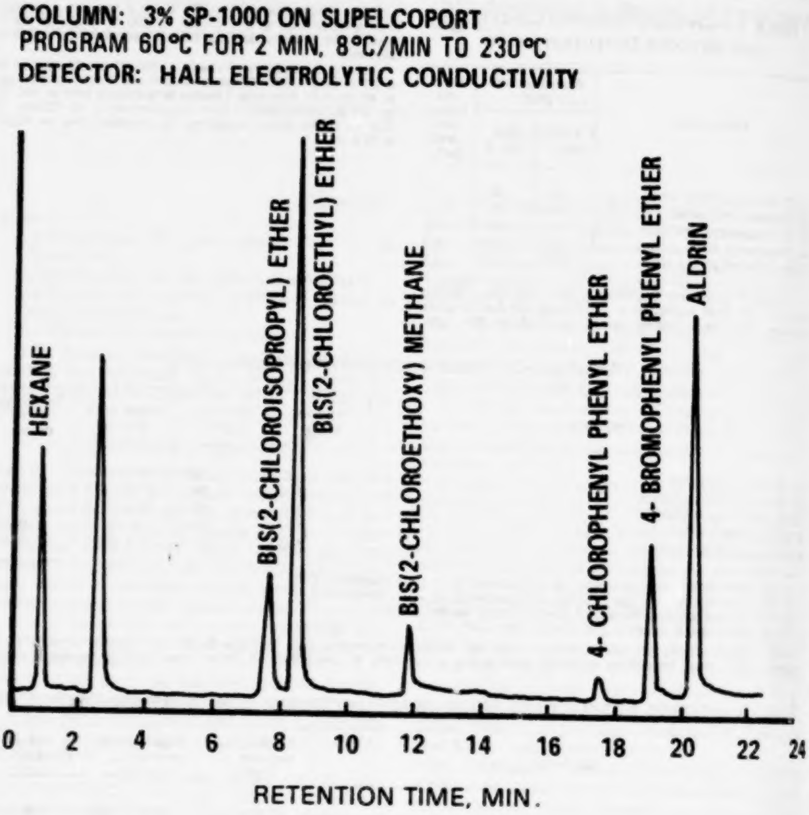

Figure 1. Gas chromatogram of haloethers.

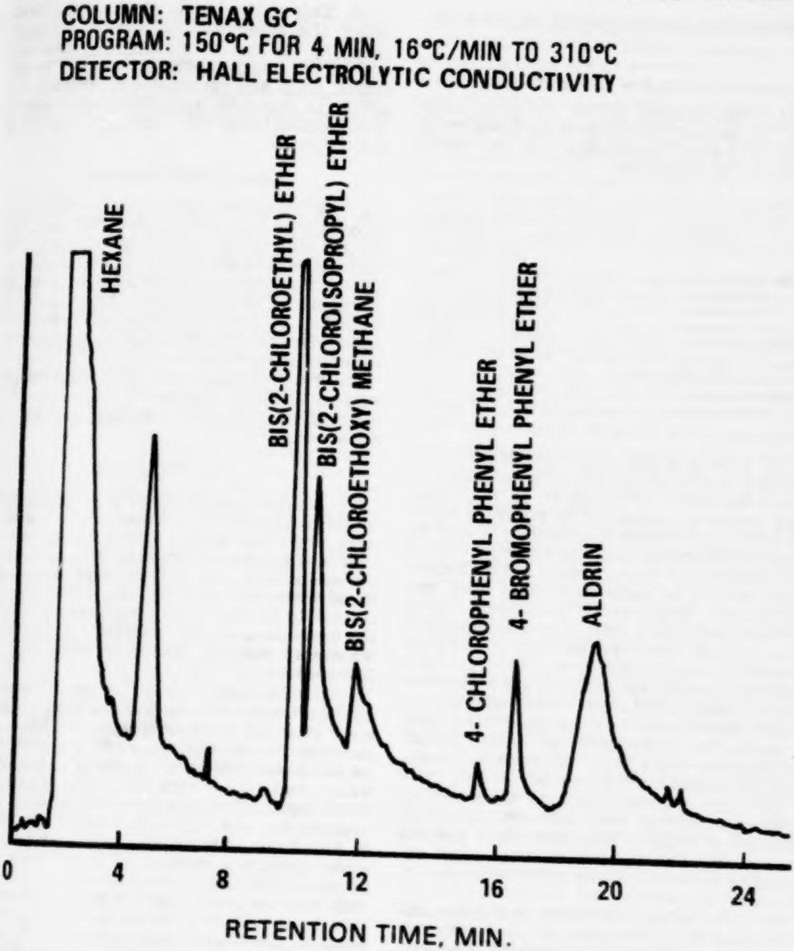

Figure 2. Gas chromatogram of haloethers.

METHOD 612—CHLORINATED HYDROCARBONS

1. Scope and Application

1.1 This method covers the determination of certain chlorinated hydrocarbons. The following parameters can be determined by this method:

Parameter	STORET No.	CAS No.
2-Chloronaphthalene	34581	91-58-7
1,2-Dichlorobenzene	34536	95-50-1
1,3-Dichlorobenzene	34566	541-73-1
1,4-Dichlorobenzene	34571	106-46-7
Hexachlorobenzene	39700	118-74-1
Hexachlorobutadiene	34391	87-68-3
Hexachlorocyclopentadiene	34386	77-47-4
Hexachloroethane	34396	67-72-1
1,2,4-Trichlorobenzene	34551	120-82-1

1.2 This is a gas chromatographic (GC) method applicable to the determination of the compounds listed above in municipal and industrial discharges as provided under 40 CFR 136.1. When this method is used to analyze unfamiliar samples for any or all of the compounds above, compound identifications should be supported by at least one additional qualitative technique. This method describes a second gas chromatographic column that can be used to confirm measurements made with the primary column. Method 625 provides gas chromatograph/mass spectrometer (GC/MS) conditions appropriate for the qualitative and quantitative confirmation of results for all of the parameters listed above, using the extract produced by this method.

1.3 The method detection limit (MDL, defined in Section 14.1)[1] for each parameter is listed in Table 1. The MDL for a specific wastewater may differ from those listed, depending upon the nature of interferences in the sample matrix.

1.4 The sample extraction and concentration steps in this method are essentially the same as in Methods 606, 608, 609, and 611. Thus, a single sample may be extracted to measure the parameters included in the scope of each of these methods. When cleanup is required, the concentration levels must be high enough to permit selecting aliquots, as necessary, to apply appropriate cleanup procedures. The analyst is allowed the latitude, under Section 12, to select chromatographic conditions appropriate for the simultaneous measurement of combinations of these parameters.

1.5 Any modification of this method, beyond those expressly permitted, shall be considered as a major modification subject to application and approval of alternate test procedures under 40 CFR 136.4 and 136.5.

1.6 This method is restricted to use by or under the supervision of analysts experienced in the use of a gas chromatograph and in the interpretation of gas chromatograms. Each analyst must demonstrate the ability to generate acceptable results with this method using the procedure described in Section 8.2.

2. Summary of Method

2.1 A measured volume of sample, approximately 1-L, is extracted with methylene chloride using a separatory funnel. The methylene chloride extract is dried and exchanged to hexane during concentration to a volume of 10 mL or less. The extract is separated by gas chromatography and the parameters are then measured with an electron capture detector.[2]

2.2 The method provides a Florisil column cleanup procedure to aid in the elimination of interferences that may be encountered.

3. Interferences

3.1 Method interferences may be caused by contaminants in solvents, reagents, glassware, and other sample processing hardware that lead to discrete artifacts and/or elevated baselines in gas chromatograms. All of these materials must be routinely demonstrated to be free from interferences under the conditions of the analysis by running laboratory reagent blanks as described in Section 8.1.3.

3.1.1 Glassware must be scrupulously cleaned.[3] Clean all glassware as soon as possible after use by rinsing with the last solvent used in it. Solvent rinsing should be followed by detergent washing with hot water, and rinses with tap water and distilled water. The glassware should then be drained dry, and heated in a muffle furnace at 400 °C for 15 to 30 min. Some thermally stable materials, such as PCBs, may not be eliminated by this treatment. Solvent rinses with acetone and pesticide quality hexane may be substituted for the muffle furnace heating. Thorough rinsing with such solvents usually eliminates PCB interference. Volumetric ware should not be heated in a muffle furnace. After drying and cooling, glassware should be sealed and stored in a clean environment to prevent any accumulation of dust or other contaminants. Store inverted or capped with aluminum foil.

3.1.2 The use of high purity reagents and solvents helps to minimize interference problems. Purification of solvents by distillation in all-glass systems may be required.

3.2 Matrix interferences may be caused by contaminants that are co-extracted from the sample. The extent of matrix interferences will vary considerably from source to source, depending upon the nature and diversity of the industrial complex or municipality being sampled. The cleanup procedure in Section 11 can be used to overcome many of these interferences, but unique samples may require additional cleanup approaches to achieve the MDL listed in Table 1.

4. Safety

4.1 The toxicity or carcinogenicity of each reagent used in this method has not been precisely defined; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material data handling sheets should also be made available to all personnel involved in the chemical analysis. Additional references to laboratory safety are available and have been identified [4-6] for the information of the analyst.

5. Apparatus and Materials

5.1 Sampling equipment, for discrete or composite sampling.

5.1.1 Grab sample bottle—1-L or 1-qt, amber glass, fitted with a screw cap lined with Teflon. Foil may be substituted for Teflon if the sample is not corrosive. If amber bottles are not available, protect samples from light. The bottle and cap liner must be washed, rinsed with acetone or methylene chloride, and dried before use to minimize contamination.

5.1.2 Automatic sampler (optional)—The ampler must incorporate glass sample conainers for the collection of a minimum of 50 mL of sample. Sample containers must e kept refrigerated at 4 °C and protected rom light during compositing. If the samler uses a peristaltic pump, a minimum ength of compressible silicone rubber ubing may be used. Before use, however, he compressible tubing should be thorughly rinsed with methanol, followed by epeated rinsings with distilled water to inimize the potential for contamination of he sample. An integrating flow meter is reuired to collect flow proportional composes.

5.2 Glassware (All specifications are sugested. Catalog numbers are included for ilstration only.):

5.2.1 Separatory funnel—2-L, with Teflon opcock.

5.2.2 Drying column—Chromatographic lumn, approximately 400 mm long x 19 m ID, with coarse frit filter disc.

5.2.3 Chromatographic column—300 long x 10 mm ID, with Teflon stopcock and coarse frit filter disc at bottom.

5.2.4 Concentrator tube, Kuderna-Danish—10-mL, graduated (Kontes K-570050-1025 or equivalent). Calibration must be checked at the volumes employed in the test. Ground glass stopper is used to prevent evaporation of extracts.

5.2.5 Evaporative flask, Kuderna-Danish—500-mL (Kontes K-570001-0500 or equivalent). Attach to concentrator tube with springs.

5.2.6 Snyder column, Kuderna-Danish—Three-ball macro (Kontes K-503000-0121 or equivalent).

5.2.7 Vials—10 to 15-mL, amber glass, with Teflon-lined screw cap.

5.3 Boiling chips—Approximately 10/40 mesh. Heat to 400 °C for 30 min or Soxhlet extract with methylene chloride.

5.4 Water bath—Heated, with concentric ring cover, capable of temperature control (± 2 °C). The bath should be used in a hood.

5.5 Balance—Analytical, capable of accurately weighing 0.0001 g.

5.6 Gas chromatograph—An analytical system complete with gas chromatograph suitable for on-column injection and all required accessories including syringes, analytical columns, gases, detector, and strip-chart recorder. A data system is recommended for measuring peak areas.

5.6.1 Column 1—1.8 m long x 2 mm ID glass, packed with 1% SP-1000 on Supelcoport (100/120 mesh) or equivalent. Guidelines for the use of alternate column packings are provide in Section 12.1.

5.6.2 Column 2—1.8 m long × 2 mm ID glass, packed with 1.5% OV-1/2.4% OV-225 on Supelcoport (80/100 mesh) or equivalent. This column was used to develop the method performance statements in Section 14.

5.6.3 Detector— Electron capture detector. This detector has proven effective in the analysis of wastewaters for the parameters listed in the scope (Section 1.1), and was used to develop the method performance statements in Section 14. Guidelines for the use of alternate detectors are provided in Section 12.1.

6. Reagents

6.1 Reagent water— Reagent water is defined as a water in which an interferent is not observed at the MDL of the parameters of interest.

6.2 Acetone, hexane, isooctane, methanol, methylene chloride, petroleum ether (boiling range 30 to 60 °C)—Pesticide quality or equivalent.

6.3 Sodium sulfate—(ACS) Granular, anhydrous. Purify heating at 400 °C for 4 h in a shallow tray.

6.4 Florisil—PR grade (60/100 mesh). Purchase activated at 1250 °F and store in the dark in glass containers with ground glass stoppers or foil-lined screw caps. Before use, activate each batch at least 16 h at 130 ° C in a foil-covered glass container and allow to cool.

6.5 Stock standard solution (1.00 μg/μL)—Stock standard solutions can be prepared from pure standard materials or purchased as certified solutions.

6.5.1 Prepare stock standard solutions by accurately weighing about 0.0100 g of pure material. Dissolve the material in isooctane and dilute to volume in a 120-mL volumetric flask. Larger volumes can be used at the convenience of the analyst. When compound purity is assayed to be 96% or greater, the weight can be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards can be used at any concentration if they are certified by the manufacturer or by an independent source.

6.5.2 Transfer the stock standard solutions into Teflon-sealed screw-cap bottles. Store at 4 °C and protect from light. Stock standard solutions should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

6.5.3 Stock standard solutions must be replaced after six months, or sooner if comparision with check standards indicates a problem.

6.6 Quality control check sample concentrate—See Section 8.2.1.

7. Calibration

7.1 Establish gas chromatographic operating conditions equivalent to those given in Table 1. The gas chromatographic system can be calibrated using the external standard technique (Section 7.2) or the internal standard technique (Section 7.3).

7.2 External standard calibration procedure:

7.2.1 Prepare calibration standards at a minimum of three concentration levels for each parameter of interest by adding volumes of one or more stock standards to a volumetric flask and diluting to volume with isooctane. One of the external standards should be at a concentration near, but above, the MDL (Table 1) and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the detector.

7.2.2 Using injections of 2 to 5 μL, analyze each calibration standard according to Section 12 and tabulate peak height or area responses against the mass injected. The results can be used to prepare a calibration curve for each compound. Alternatively, if the ratio of response to amount injected (calibration factor) is a constant over the working range (<10% relative standard deviation, RSD), linearity through the origin can be assumed and the average ratio or calibration factor can be used in place of a calibration curve.

7.3 Internal standard calibration procedure—To use this approach, the analyst must select one or more internal standards that are similar in analytical behavior to the compounds of interest. The analyst must further demonstrate that the measurement of the internal standard is not affected by method or matrix interferences. Because of these limitations, no internal standard can be suggested that is applicable to all samples.

7.3.1 Prepare calibration standards at a minimum of three concentration levels for each parameter of interest by adding volumes of one or more stock standards to a volumetric flask. To each calibration standard, add a known constant amount of one or more internal standards, and dilute to volume with isooctane. One of the standards should be at a concentration near, but above, the MDL and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the detector.

7.3.2 Using injections of 2 to 5 μL, analyze each calibration standard according to Section 12 and tabulate peak height or area responses against concentration for each compound and internal standard. Calculate response factors (RF) for each compound using Equation 1.

$$RF = \frac{(A_s)(C_{is})}{(A_{is})(C_s)}$$

Equation 1

where:

A_s=Response for the parameter to be measured.

A_{is}=Response for the internal standard.

C_{is}=Concentration of the internal standard (μg/L).

C_s=Concentration of the parameter to be measured (μg/L).

If the RF value over the working range is a constant (<10% RSD), the RF can be assumed to be invariant and the average RF can be used for calculations. Alternatively, the results can be used to plot a calibration curve of response ratios, A_s/A_{is}, vs. RF.

7.4 The working calibration curve, calibration factor, or RF must be verified on each working day by the measurement of one or more calibration standards. If the response for any parameter varies from the predicted response by more than ±15%, a new calibration curve must be prepared for that compound.

7.5 Before using any cleanup procedure, the analyst must process a series of calibration standards through the procedure to validate elution patterns and the absence of interferences from the reagents.

8. Quality Control

8.1 Each laboratory that uses this method is required to operate a formal quality control program. The minimum requirements of this program consist of an initial demonstration of laboratory capability and an ongoing analysis of spiked samples to evaluate and document data quality. The laboratory must maintain records to document the quality of data that is generated. Ongoing data quality checks are compared with established performance criteria to determine if the results of analyses meet the performance characteristics of the method. When the results of sample spikes indicate atypical method performance, a quality control check standard must be analyzed to confirm that the measurements were performed in an in-control mode of operation.

8.1.1 The analyst must make an initial, one-time, demonstration of the ability to generate acceptable accuracy and precision with this method. This ability is established as described in Section 8.2.

8.1.2 In recognition of advances that are occurring in chromatography, the analyst is permitted certain options (detailed in Sections 10.4, 11.1, and 12.1) to improve the separations or lower the cost of measurements. Each time such modification is made to the method, the analyst is required to repeat the procedure in Section 8.2.

8.1.3 Before processing any samples, the analyst must analyze a reagent water blank to demonstrate that interferences from the analytical system and glassware are under control. Each time a set of samples is extracted or reagents are changed, a reagent water blank must be processed as a safeguard against laboratory contamination.

8.1.4 The laboratory must, on an ongoing basis, spike and analyze a minimum of 10% of all samples to monitor and evaluate laboratory data quality. This procedure is described in Section 8.3.

8.1.5 The laboratory must, on an ongoing basis, demonstrate through the analyses of quality control check standards that the operation of the measurement system is in control. This procedure is described in Section 8.4. The frequency of the check standard analyses is equivalent to 10% of all samples analyzed but may be reduced if spike recoveries from samples (Section 8.3) meet all specified quality control criteria.

8.1.6 The laboratory must maintain performance records to document the quality of data that is generated. This procedure is described in Section 8.5.

8.2 To establish the ability to generate acceptable accuracy and precision, the analyst must perform the following operations.

8.2.1 A quality control (QC) check sample concentrate is required containing each parameter of interest at the following concentrations in acetone: Hexachloro-substituted parameters, 10 μg/mL; any other chlorinated hydrocarbon, 100 μg/mL. The QC check sample concentrate must be obtained from the U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory in Cincinnati, Ohio, if available. If not available from that source, the QC check sample concentrate must be obtained from another external source. If not available from either source above, the QC check sample concentrate must be prepared by the laboratory using stock standards prepared independently from those used for calibration.

8.2.2 Using a pipet, prepare QC check samples at the test concentrations shown in Table 2 by adding 1.00 mL of QC check sample concentrate to each of four 1-L aliquots of reagent water.

8.2.3 Analyze the well-mixed QC check samples according to the method beginning in Section 10.

8.2.4 Calculate the average recovery ($\bar{X}$) in μg/L, and the standard deviation of the recovery (s) in μg/L, for each parameter using the four results.

8.2.5 For each parameter compare s and $\bar{X}$ with the corresponding acceptance criteria for precision and accuracy, respectively, found in Table 2. If s and $\bar{X}$ for all parameters of interest meet the acceptance criteria, the system performance is acceptable and analysis of actual samples can begin. If any individual s exceeds the precision limit or any individual $\bar{X}$ falls outside the range for accuracy, the system performance is unacceptable for that parameter.

NOTE: The large number of parameters in Table 2 presents a substantial probability that one or more will fail at least one of the acceptance criteria when all parameters are analyzed.

8.2.6 When one or more of the parameters tested fail at least one of the acceptance criteria, the analyst must proceed according to Section 8.2.6.1 or 8.2.6.2.

8.2.6.1 Locate and correct the source of the problem and repeat the test for all parameters of interest beginning with Section 8.2.2.

8.2.6.2 Beginning with Section 8.2.2, repeat the test only for those parameters that failed to meet criteria. Repeated failure, however, will confirm a general problem with the measurement system. If this occurs, locate and correct the source of the problem and repeat the test for all compounds of interest beginning with Section 8.2.2.

8.3 The laboratory must, on an ongoing basis, spike at least 10% of the samples from each sample site being monitored to assess accuracy. For laboratories analyzing one to ten samples per month, at least one spike sample per month is required.

8.3.1 The concentration of the spike in the sample should be determined as follows:

8.3.1.1 If, as in compliance monitoring, the concentration of a specific parameter in the sample is being checked against a regulatory concentration limit, the spike should be at that limit or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.2 If the concentration of a specific parameter in the sample is not being checked against a limit specific to that parameter, the spike should be at the test concentration in Section 8.2.2 or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.3 If it is impractical to determine background levels before spiking (e.g., maximum holding times will be exceeded), the spike concentration should be (1) the regulatory concentration limit, if any; or, if none by (2) the larger of either 5 times higher than the expected background concentration or the test concentration in Section 8.2.2.

8.3.2 Analyze one sample aliquot to determine the background concentration (B) of each parameter. In necessary, prepare a new QC check sample concentrate (Section 8.2.1) appropriate for the background concentrations in the sample. Spike a second sample aliquot with 1.0 mL of the QC check sample concentrate and analyze it to determine the concentration after spiking (A) of each parameter. Calculate each percent recovery (P) as 100 (A-B)%/T, where T is the known true value of the spike.

8.3.3 Compare the percent recovery (P) for each parameter with the corresponding QC acceptance criteria found in Table 2. These acceptance criteria were calculated to include an allowance for error in measurement of both the background and spike concentrations, assuming a spike to background ratio of 5:1. This error will be accounted for to the extent that the analyst's spike to background ratio approaches 5:1.[7] If spiking was performed at a concentration lower than the test concentration in Section 8.2.2, the analyst must use either the QC acceptance criteria in Table 2, or optional QC acceptance criteria calculated for the specific spike concentration. To calculate optional acceptance criteria for the recovery of a parameter: (1) Calculate accuracy (X′) using the equation in Table 3, substituting the spike concentration (T) for C; (2) calculate overall precision (S′) using the equation in Table 3, substituting X′ for $\bar{X}$; (3) calculate the range for recovery at the spike concentration as $(100\ X'/T) \pm 2.44\ (100\ S'/T)\%$.[7]

8.3.4 If any individual P falls outside the designated range for recovery, that parameter has failed the acceptance criteria. A check standard containing each parameter that failed the criteria must be analyzed as described in Section 8.4.

8.4. If any parameter fails the acceptance criteria for recovery in Section 8.3, a QC check standard containing each parameter that failed must be prepared and analyzed.

NOTE: The frequency for the required analysis of a QC check standard will depend upon the number of parameters being simultaneously tested, the complexity of the sample matrix, and the performance of the laboratory.

8.4.1 Prepare the QC check standard by adding 1.0 mL of QC check sample concentrate (Sections 8.2.1 or 8.3.2) to 1 L of reagent water. The QC check standard needs only to contain the parameters that failed criteria in the test in Section 8.3.

8.4.2 Analyze the QC check standard to determine the concentration measured (A) of each parameter. Calculate each percent recovery (P_s) as 100 (A/T)%, where T is the true value of the standard concentration.

8.4.3 Compare the percent recovery (P_s) for each parameter with the corresponding QC acceptance criteria found in Table 2. Only parameters that failed the test in Section 8.3 need to be compared with these criteria. If the recovery of any such parameter falls outside the designated range, the laboratory performance for that parameter is judged to be out of control, and the problem must be immediately identified and corrected. The analytical result for that parameter in the unspiked sample is suspect and may not be reported for regulatory compliance purposes.

8.5 As part of the QC program for the laboratory, method accuracy for wastewater samples must be assessed and records must be maintained. After the analysis of five spiked wastewater samples as in Section 8.3, calculate the average percent recovery (P) and the standard deviation of the percent recovery (s_p). Express the accuracy assessment as a percent recovery interval from $P-2s_p$ to $P+2s_p$. If $P=90\%$ and $s_p=10\%$, for example, the accuracy interval is expressed as 70-110%. Update the accuracy assessment for each parameter on a regular basis (e.g. after each five to ten new accuracy measurements).

8.6 It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Field duplicates may be analyzed to assess the precision of the environmental measurements. When doubt exists over the identification of a peak on the chromatogram, confirmatory techniques such as gas chromatography with a dissimilar column, specific element detector, or mass spectrometer must be used. Whenever possible, the laboratory should analyze standard reference materials and participate in relevent performance evaluation studies.

9. Sample Collection, Preservation, and Handling

9.1 Grab samples must be collected in glass containers. Conventional sampling practices[8] should be followed, except that the bottle must not be prerinsed with sample before collection. Composite samples should be collected in refrigerated glass containers in accordance with the requirements of the program. Automatic sampling equipment must be as free as possible of Tygon tubing and other potential sources of contamination.

9.2 All samples must be iced or refrigerated at 4 °C from the time of collection until extraction.

9.3 All samples must be extracted within 7 days of collection and completely analyzed within 40 days of extraction.[2]

10. Sample Extraction

10.1 Mark the water meniscus on the side of the sample bottle for later determination of sample volume. Pour the entire sample into a 2-L separatory funnel.

10.2 Add 60 mL of methylele chloride to the sample bottle, seal, and shake 30 s to rinse the inner surface. Transfer the solvent to the separatory funnel and extract the sample by shaking the funnel for 2 min with periodic venting to release excess pressure. Allow the organic layer to separate from the water phase for a minimum of 10 min. If the emulsion interface between layers is more than one-third the volume of the solvent layer, the analyst must employ mechanical techniques to complete the phase separation. The optimum technique depends upon the sample, but may include stirring, filtration of the emulsion through glass wool, centrifugation, or other physical methods. Collect the methylene chloride extract in a 250-mL Erlenmeyer flask.

10.3 Add a second 60-mL volume of methylene chloride to the sample bottle and repeat the extraction procedure a second time, combining the extracts in the Erlenmeyer flask. Perform a third extraction in the same manner.

10.4 Assemble a Kuderna-Danish (K-D) concentrator by attaching a 10-mL concentrator tube to a 500-mL evaporative flask. Other concentration devices or techniques may be used in place of the K-D concentrator if the requirements of Section 8.2 are met.

10.5 Pour the combined extract through a solvent-rinsed drying column containing about 10 cm of anhydrous sodium sulfate, and collect the extract in the K-D concentrator. Rinse the Erlenmeyer flask and column with 20 to 30 mL of methylene chloride to complete the quantitative transfer.

10.6 Add one or two clean boiling chips to the evaporative flask and attach a three-ball Snyder column. Prewet the Snyder column by adding about 1 mL of methylene chloride to the top. Place the K-D apparatus on a hot water bath (60 to 65 °C) so that the concentrator tube is partially immersed in the hot water, and the entire lower rounded surface of the flask is bathed with hot vapor. Adjust the vertical position of the apparatus and the water temperature as required to complete the concentration in 15 to 20 min. At the proper rate of distillation the balls of the column will actively chatter but the chambers will not flood with condensed solvent. When the apparent volume of liquid reaches 1 to 2 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 min.

NOTE: The dichloribenzenes have a sufficiently high volatility that significant losses may occur in concentration steps if care is not exercised. It is important to maintain a constant gentle evaporation rate and not to allow the liquid volume to fall below 1 to 2 mL before removing the K-D apparatus from the hot water bath.

10.7 Momentarily remove the Snyder column, add 50 mL of hexane and a new boiling chip, and reattach the Snyder column. Raise the tempeature of the water bath to 85 to 90 °C. Concentrate the extract as in Section 10.6, except use hexane to prewet the column. The elapsed time of concentration should be 5 to 10 min.

10.8 Romove the Snyder column and rinse the flask and its lower joint into the concentrator tube with 1 to 2 mL of hexane. A 5-mL syringe is recommended for this operation. Stopper the concentrator tube and store refrigerated if further processing will not be performed immediately. If the extract will be stored longer than two days, it should be transferred to a Teflon-sealed screw-cap vial. If the sample extract requires no further cleanup, proceed with gas chromatographic analysis (Section 12). If the sample requires further cleanup, proceed to Section 11.

10.9 Determine the original sample volume by refilling the sample bottle to the mark and transferring the liquid to a 1000-mL graduated cylinder. Record the sample volume to the nearest 5 mL.

11. Cleanup and Separation

11.1 Cleanup procedures may not be necessary for a relatively clean sample matrix. If particular circumstances demand the use of a cleanup procedure, the analyst may use the procedure below or any other appropriate procedure. However, the analyst first must demonstrate that the requirements of Section 8.2 can be met using the method as revised to incorporate the cleanup procedure.

11.2 Florisil column cleanup for chlorinated hydrocarbons:

11.2.1 Adjust the sample extract to 10 mL with hexane.

11.2.2 Place 12 g of Florisil into a chromatographic column. Tap the column to settle the Florisil and add 1 to 2 cm of anhydrous sodium sulfate to the top.

11.2.3 Preelute the column with 100 mL of petroleum ether. Discard the eluate and just prior to exposure of the sodium sulfate layer to the air, quantitatively transfer the sample extract onto the column by decantation and subsequent petroleum ether washings. Discard the eluate. Just prior to exposure of the sodium sulfate layer to the air, begin eluting the column with 200 mL of petroleum ether and collect the eluate in a 500-mL K-D flask equipped with a 10-mL concentrator tube. This fraction should contain all of the chlorinated hydrocarbons.

11.2.4 Concentrate the fraction as in Section 10.6, except use hexane to prewet the column. When the apparatus is cool, remove the Snyder column and rinse the flask and its lower joint into the concentrator tube with hexane. Analyze by gas chromatography (Section 12).

12. Gas Chromatography

12.1 Table 1 summarizes the recommended operating conditions for the gas chromatograph. Included in this table are retention times and MDL that can be achieved under these conditions. Examples of the separations achieved by Columl 2 are shown in Figures 1 and 2. Other packed or capillary (open-tubular) columns, chromatographic conditions, or detectors may be used if the requirements of Section 8.2 are met.

12.2 Calibrate the system daily as described in Section 7.

12.3 If the internal standard calibration procedure is being used, the internal standard must be added to the sample extract and mixed throughly immediately before injection into the gas chromatograph.

12.4 Inject 2 to 5 µL of the sample extract or standard into the gas chromatograph using the solvent-flush techlique. Smaller (1.0 µL) volumes may be injected if automatic devices are employed. Record the volume injected to the nearest 0.05 µL, the total extract volume, and the resulting peak size in area or peak height units.

12.5 Identify the parameters in the sample by comparing the retention times of the peaks in the sample chromatogram with those of the peaks in standard chromatograms. The width of the retention time window used to make identifications should be based upon measurements of actual retention time variations of standards over the course of a day. Three times the standard deviation of a retention time for a compound can be used to calculate a suggested window size; however, the experience of the analyst should weigh heavily in the interpretation of chromatograms.

12.6 If the response for a peak exceeds the working range of the system, dilute the extract and reanalyze.

12.7 If the measurement of the peak response is prevented by the presence of interferences, further cleanup is required.

13. Calculations

13.1 Determine the concentration of individual compounds in the sample.

13.1.1 If the external standard calibration procedure is used, calculate the amount of material injected from the peak response using the calibration curve or calibration factor determined in Section 7.2.2. The concentration in the sample can be calculated from Equation 2.

$$\text{Concentration } (\mu g/L) = \frac{(A)(V_t)}{(V_i)(V_s)}$$

Equation 2

where:

A = Amount of material injected (ng).
V_i = Volume of extract injected (µL).
V_t = Volume of total extract (µL).
V_s = Volume of water extracted (mL).

13.1.2 If the internal standard calibration procedure is used, calculate the concentration in the sample using the response factor (RF) determined in Section 7.3.2 and Equation 3.

$$\text{Concentration } (\mu g/L) = \frac{(A_s)(I_s)}{(A_{is})(RF)(V_o)}$$

Equation 3

where:

A_s=Response for the parameter to be measured.

A_{is}=Response for the internal standard.

I_s=Amount of internal standard added to each extract (μg).

V_o=Volume of water extracted (L).

13.2 Report results in μg/L without correction for recovery data. All QC data obtained should be reported with the sample results.

14. Method Performance

14.1 The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero.[1] The MDL concentrations listed in Table 1 were obtained using reagent water.[10] Similar results were achieved using representative wastewaters. The MDL actually achieved in a given analysis will vary depending on instrument sensitivity and matrix effects.

14.2 This method has been tested for linearity of spike recovery from reagent water and has been demonstrated to be applicable over the concentration range from 4×MDL to 1000×MDL.[10]

14.3 This method was tested by 20 laboratories using reagent water, drinking water, surface water, and three industrial wastewaters spiked at six concentrations over the range 1.0 to 356 μg/L.[11] Single operator precision, overall precision, and method accuracy were found to be directly related to the concentration of the parameter and essentially independent of the sample matrix. Linear equations to describe these relationships are presented in Table 3.

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TABLE 1.—CHROMATOGRAPHIC CONDITIONS AND METHOD DETECTION LIMITS

Parameter	Retention time (min)		Method detection limit (μg/L)
	Column 1	Column 2	
1,3-Dichlorobenzene	4.5	6.8	1.19
Hexachloroethane	4.9	8.3	0.03

TABLE 1.—CHROMATOGRAPHIC CONDITIONS AND METHOD DETECTION LIMITS—Continued

Parameter	Retention time (min)		Method detection limit (μg/L)
	Column 1	Column 2	
1,4-Dichlorobenzene	5.2	7.6	1.34
1,2-Dichlorobenzene	6.6	9.3	1.14
Hexachlorobutadiene	7.7	20.0	0.34
1,2,4-Trichlorobenzene	15.5	22.3	0.05
Hexachlorocyclopentadiene	nd	[c] 16.5	0.40
2-Chloronaphthalene	[a] 2.7	[b] 3.6	0.94
Hexachlorobenzene	[a] 5.6	[b] 10.1	0.05

Column 1 conditions: Supelcoport (100/120 mesh) coated with 1% SP-1000 packed in a 1.8 m x 2 mm ID glass column with 5% methane/95% argon carrier gas at 25 mL/min. flow rate. Column temperature held isothermal at 65 °C, except when otherwise indicated.

Column 2 conditions: Supelcoport (80/100 mesh) coated with 1.5% OV-1/2.4% OV-225 packed in a 1.8 m x 2 mm ID glass column with 5% methane/95% argon carrier gas at 25 mL/min. flow rate. Column temperature held isothermal at 75 °C, except where otherwise indicated.

nd=Not determined.

[a] 150 °C column temperature.

[b] 165 °C column temperature.

[c] 100 °C column temperature.

TABLE 2.—QC ACCEPTANCE CRITERIA—METHOD 612

Parameter	Test conc. (μg/L)	Limit for s (μg/L)	Range for $\bar{X}$ (μg/L)	Range for P, P_s (percent)
2-Chloronaphthalene	100	37.3	29.5–126.9	9–148
1,2-Dichlorobenzene	100	28.3	23.5–145.1	9–160
1,3-Dichlorobenzene	100	26.4	7.2–138.6	D–150
1,4-Dichlorobenzene	100	20.8	22.7–126.9	13–137
Hexachlorobenzene	10	2.4	2.6–14.8	15–159
Hexachlorobutadiene	10	2.2	D–12.7	D–139
Hexachlorocyclopentadiene	10	2.5	D–10.4	D–111
Hexachloroethane	10	3.3	2.4–12.3	8–139
1,2,4-Trichlorobenzene	100	31.6	20.2–133.7	5–149

s=Standard deviation of four recovery measurements, in μg/L (Section 8.2.4).

$\bar{X}$=Average recovery for four recovery measurements, in μg/L (Section 8.2.4).

P, P_s=Percent recovery measured (Section 8.3.2, Section 8.4.2).

D=Detected; result must be greater than zero.

NOTE: These criteria are based directly upon the method performance data in Table 3. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table 3.

TABLE 3.—METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION—METHOD 612

Parameter	Acccuracy, as recovery, X′ (μg/L)	Single analyst precision, s_r′ (μg/L)	Overall precision, S′ (μg/L)
2-Chloronaphthalene	0.75C+3.21	$0.28\bar{X}-1.17$	$0.38\bar{X}-1.39$
1,2-Dichlorobenzene	0.85C−0.70	$0.22\bar{X}-2.95$	$0.41\bar{X}-3.92$
1,3-Dichlorobenzene	0.72C+0.87	$0.21\bar{X}-1.03$	$0.49\bar{X}-3.98$
1,4-Dichlorobenzene	0.72C+2.80	$0.16\bar{X}-0.48$	$0.35\bar{X}-0.57$
Hexachlorobenzene	0.87C−0.02	$0.14\bar{X}+0.07$	$0.36\bar{X}-0.19$
Hexachlorobutadiene	0.61C+0.03	$0.18\bar{X}+0.08$	$0.53\bar{X}-0.12$
Hexachlorocyclopentadiene [a]	0.47C	$0.24\bar{X}$	$0.50\bar{X}$
Hexachloroethane	0.74C−0.02	$0.23\bar{X}+0.07$	$0.36\bar{X}-0.00$
1,2,4-Trichlorobenzene	0.76C+0.98	$0.23\bar{X}-0.44$	$0.40\bar{X}-1.37$

X′=Expected recovery for one or more measurements of a sample containing a concentration of C, in μg/L.

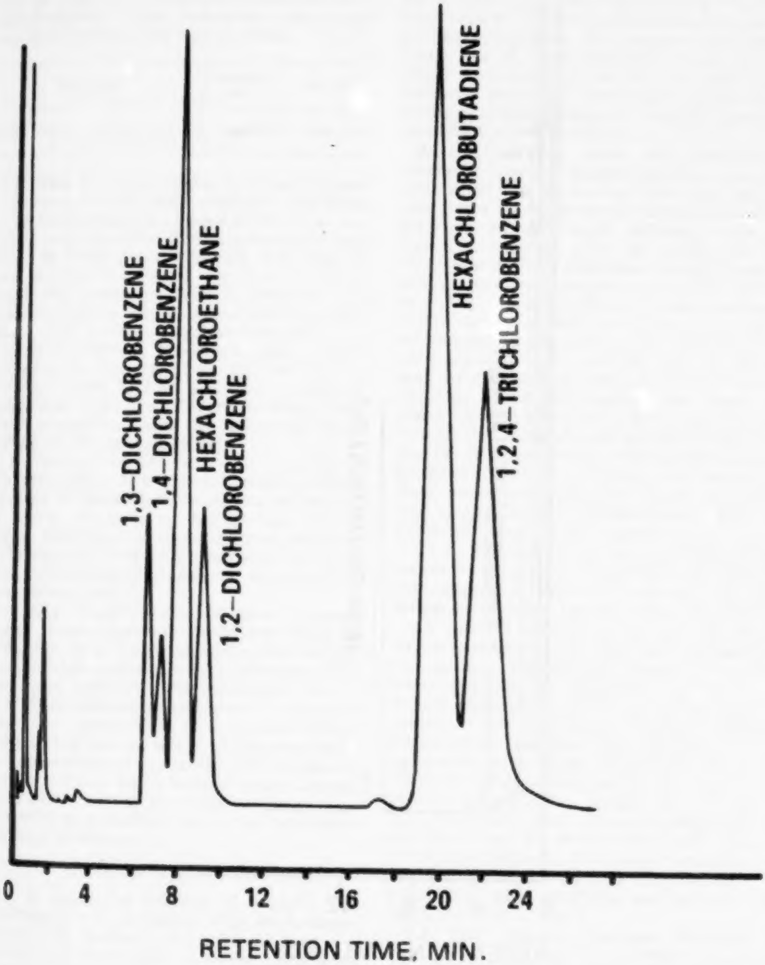
s_r′=Expected single analyst standard deviation of measurements at an average concentration found of $\bar{X}$, in μg/L.

S′=Expected interlaboratory standard deviation of measurements at an average concentration found of $\bar{X}$, in μg/L.

C=True value for the concentration, in μg/L.

$\bar{X}$=Average recovery found for measurements of samples containing a concentration of C, in μg/L.

[a] Estimates based upon the performance in a single laboratory.[12]



COLUMN: 1.5% OV-1/2.4% OV-225 ON SUPELCOPORT
TEMPERATURE: 75°C
DETECTOR: ELECTRON CAPTURE

Figure 1. Gas chromatogram of chlorinated hydrocarbons.

COLUMN: 1.5% OV-1/2.4% OV-225 ON SUPELCOPORT
TEMPERATURE: 165°C
DETECTOR: ELECTRON CAPTURE

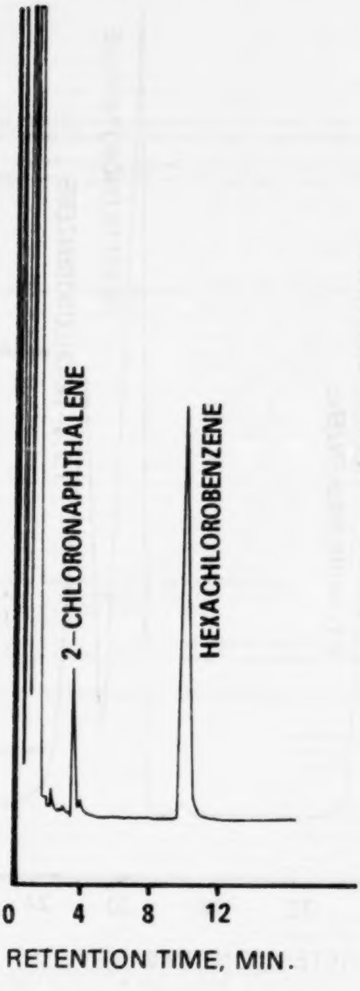


Figure 2. Gas chromatogram of chlorinated hydrocarbons.

METHOD 613—2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN

1. Scope and Application

1.1 This method covers the determination of 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). The following parameter may be determined by this method:

Parameter	STORET No.	CAS No.
2,3,7,8-TCDD	34675	1746-01-6

1.2 This is a gas chromatographic/mass spectrometer (GC/MS) method applicable to the determination of 2,3,7,8-TCDD in municipal and industrial discharges as provided under 40 CFR 136.1. Method 625 may be used to screen samples for 2,3,7,8-TCDD. When the screening test is positive, the final qualitative confirmation and quantification must be made using Method 613.

1.3 The method detection limit (MDL, defined in Section 14.1)[1] for 2,3,7,8-TCDD is listed in Table 1. The MDL for a specific wastewater may be different from that listed, depending upon the nature of interferences in the sample matrix.

1.4 Because of the extreme toxicity of this compound, the analyst must prevent exposure to himself, of to others, by materials knows or believed to contain 2,3,7,8-TCDD. Section 4 of this method contains guidelines and protocols that serve as minimum safe-handling standards in a limited-access laboratory.

1.5 Any modification of this method, beyond those expressly permitted, shall be considered as a major modification subject to application and approval of alternate test procedures under 40 CFR 136.4 and 136.5.

1.6 This method is restricted to use by or under the supervision of analysts experienced in the use of a gas chromatograph/mass spectrometer and in the interpretation of mass spectra. Each analyst must demontrate the ability to generate acceptable reults with this method using the procedure described in Section 8.2.

2. Summary of Method

2.1 A measured volume of sample, aproximately 1-L, is spiked with an internal tandard of labeled 2,3,7,8-TCDD and exracted with methylene chloride using a searatory funnel. The methylene chloride xtract is exchanged to hexane during conentration to a volume of 1.0 mL or less. he extract is then analyzed by capillary olumn GC/MS to separate and measure ,3,7,8-TCDD.[2,3]

2.2 The method provides selected column hromatographic cleanup proceudres to aid in the elimination of interferences that may be encountered.

3. Interferences

3.1 Method interferences may be caused by contaminants in solvents, reagents, glassware, and other sample processing hardware that lead to discrete artifacts and/or elevated backgrounds at the masses (m/z) monitored. All of these materials must be routinely demonstrated to be free from interferences under the conditions of the analysis by running laboratory reagent blanks as described in Section 8.1.3.

3.1.1 Glassware must be scrupulously cleaned.[4] Clean all glassware as soon as possible after use by rinsing with the last solvent used in it. Solvent rinsing should be followed by detergent washing with hot water, and rinses with tap water and distilled water. The glassware should then be drained dry, and heated in a muffle furnace at 400 °C for 15 to 30 min. Some thermally stable materials, such as PCBs, may not be eliminated by the treatment. Solvent rinses with acetone and pesticide quality hexane may be substituted for the muffle furnace heating. Thorough rinsing with such solvents usually eliminates PCB interference. Volumetric ware should not be heated in a muffle furnace. After drying and cooling, glassware should be sealed and stored in a clean environment to prevent any accumulation of dust or other contaminants. Store inverted or capped with aluminum foil.

3.1.2 The use of high purity reagents and solvents helps to mininmize interference problems. Purification of solvents by distillation in all-glass systems may be required.

3.2 Matrix interferences may be caused by contaminants that are coextracted from the sample. The extent of matrix interferences will vary considerably from source to source, depending upon the nature and diversity of the industrial complex or municipality being sampled. 2,3,7,8-TCDD is often associated with other interfering chlorinated compounds which are at concentrations several magnitudes higher than that of 2,3,7,8-TCDD. The cleanup producers in Section 11 can be used to overcome many of these interferences, but unique samples may require additional cleanup approaches[1,5,7] to eliminate false positives and achieve the MDL listed in Table 1.

3.3 The primary column, SP-2330 or equivalent, resolves 2,3,7,8-TCDD from the other 21 TCDD insomers. Positive results using any other gas chromatographic column must be confirmed using the primary column.

4. Safety

4.1 The toxicity or carcinogenicity of each reagent used in this method has not been precisely defined; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material data handling sheets should also be made available to all personnel involved in the chemical analysis. Additional references to laboratory safety are available and have been identified [9,10] for the information of the analyst. Benzene and 2,3,7,8-TCDD have been identified as suspected human or mammalian carcinogens.

4.2 Each laboratory must develop a strict safety program for handling 2,3,7,8-TCDD. The following laboratory practices are recommended:

4.2.1 Contamination of the laboratory will be minimized by conducting all manipulations in a hood.

4.2.2 The effluents of sample splitters for the gas chromatograph and roughing pumps on the GC/MS should pass through either a column of activated charcoal or be bubbled through a trap containing oil or high-boiling alcohols.

4.2.3 Liquid waste should be dissolved in methanol or ethanol and irradiated with ultraviolet light with a wavelength greater than 290 nm for several days. (Use F 40 BL lamps or equivalent). Analyze liquid wastes and dispose of the solutions when 2,3,7,8-TCDD can no longer be detected.

4.3 Dow Chemical U.S.A. has issued the following precautimns (revised November 1978) for safe handling of 2,3,7,8-TCDD in the laboratory:

4.3.1 The following statements on safe handling are as complete as possible on the basis of available toxicological information. The precautions for safe handling and use are necessarily general in nature since detailed, specific recommendations can be made only for the particular exposure and circumstances of each individual use. Inquiries about specific operations or uses may be addressed to the Dow Chemical Company. Assistance in evaluating the health hazards of particular plant conditions may be obtained from certain consulting laboratories and from State Departments of Health or of Labor, many of which have an industrial health service. 2,3,7,8-TCDD is extremely toxic to laboratory animals. However, it has been handled for years without injury in analytical and biological laboratories. Techniques used in handling radioactive and infectious materials are applicable to 2,3,7,8,-TCDD.

4.3.1.1 Protective equipment—Throw-away plastic gloves, apron or lab coat, safety glasses, and a lab hood adequate for radioactive work.

4.3.1.2 Training—Workers must be trained in the proper method of removing contaminated gloves and clothing without contacting the exterior surfaces.

4.3.1.3 Personal hygiene—Thorough washing of hands and forearms after each manipulation and before breaks (coffee, lunch, and shift).

4.3.1.4 Confinement—Isolated work area, posted with signs, segregated glassware and tools, plastic-backed absorbent paper on benchtops.

4.3.1.5 Waste—Good technique includes minimizing contaminated waste. Plastic bag liners should be used in waste cans. Janitors must be trained in the safe handling of waste.

4.3.1.6 Disposal of wastes—2,3,7,8-TCDD decomposes above 800 °C. Low-level waste such as absorbent paper, tissues, animal remains, and plastic gloves may be burned in a good incinerator. Gross quantities (milligrams) should be packaged securely and disposed through commercial or governmental channels which are capable of handling high-level radioactive wastes or extremely toxic wastes. Liquids should be allowed to evaporate in a good hood and in a disposable container. Residues may then be handled as above.

4.3.1.7 Decontamination—For personal decontamination, use any mild soap with plenty of scrubbing action. For decontamination of glassware, tools, and surfaces, Chlorothene NU Solvent (Trademark of the Dow Chemical Company) is the least toxic solvent shown to be effective. Satisfactory cleaning may be accomplished by rinsing with Chlorothene, then washing with any detergent and water. Dishwater may be disposed to the sewer. It is prudent to minimize solvent wastes because they may require special disposal through commercial sources which are expensive.

4.3.1.8 Laundry—Clothing known to be contaminated should be disposed with the precautions described under Section 4.3.1.6. Lab coats or other clothing worn in 2,3,7,8-TCDD work areas may be laundered.

Clothing should be collected in plastic bags. Persons who convey the bags and launder the clothing should be advised of the hazard and trained in proper handling. The clothing may be put into a washer without contact if the launderer knows the problem. The washer should be run through a cycle before being used again for other clothing.

4.3.1.9 Wipe tests—A useful method of determining cleanliness of work surfaces and tools is to wipe the surface with a piece of filter paper. Extraction and analysis by gas chromatography can achieve a limit of sensitivity of 0.1 μg per wipe. Less than 1 μ

of 2,3,7,8-TCDD per sample indicates acceptable cleanliness; anything higher warrants further cleaning. More than 10 μg on a wipe sample constitutes an acute hazard and requires prompt cleaning before further use of the equipment or work space. A high (>10 μg) 2,3,7,8-TCDD level indicates that unacceptable work practices have been employed in the past.

4.3.1.10 Inhalation—Any procedure that may produce airborne contamination must be done with good ventilation. Gross losses to a ventilation system must not be allowed. Handling of the dilute solutions normally used in analytical and animal work presents no inhalation hazards except in the case of an accident.

4.3.1.11 Accidents—Remove contaminated clothing immediately, taking precautions not to contaminate skin or other articles. Wash exposed skin vigorously and repeatedly until medical attention is obtained.

5. *Apparatus and Materials*

5.1 Sampling equipment, for discrete or composite sampling.

5.1.1 Grab sample bottle—1-L or 1-qt, amber glass, fitted with a screw cap lined with Teflon. Foil may be substituted for Teflon if the sample is not corrosive. If amber bottles are not available, protect samples from light. The bottle and cap liner must be washed, rinsed with acetone or methylene chloride, and dried before use to minimize contamination.

5.1.2 Automatic sampler (optional)—The ampler must incorporate glass sample conainers for the collection of a minimum of 250 mL of sample. Sample containers must e kept refrigerated at 4 °C and protected rom light during compositing. If the samler uses a peristaltic pump, a minimum ength of compressible silicone rubber ubing may be used. Before use, however, he compressible tubing should be thorughly rinsed with methanol, followed by epeated rinsings with distilled water to inimize the potential for contamination of he sample. An integrating flow meter is reuired to collect flow proportional composes.

5.1.3 Clearly label all samples as POISON" and ship according to U.S. Deartment of Transportation regulations.

5.2 Glassware (All specifications are sugested. Catalog numbers are included for ilstration only.):

5.2.1 Separatory funnels—2-L and 125-L, with Teflon stopcock.

5.2.2 Concentrator tube, Kuderna-anish—10-mL, graduated (Kontes K-0050-1025 or equivalent). Calibration ust be checked at the volumes employed the test. Ground glass stopper is used to event evaporation of extracts.

5.2.3 Evaporative flask, Kuderna-anish—500-mL (Kontes K-570001-0500 or equivalent). Attach to concentrator tube with springs.

5.2.4 Snyder column, Kuderna-Danish—Three-ball macro (Kontes K-503000-0121 or equivalent).

5.2.5 Snyder column, Kuderna-Danish—Two-ball micro (Kontes K-569001-0219 or equivalent).

5.2.6 Vials—10 to 15-mL, amber glass, with Teflon-lined screw cap.

5.2.7 Chromatographic column—300 mm long × 10 mm ID, with Teflon stopcock and coarse frit filter disc at bottom.

5.2.8 Chromatographic column—400 mm long × 11 mm ID, with Teflon stopcock and coarse frit filter disc at bottom.

5.3 Boiling chips—Approximately 10/40 mesh. Heat to 400 °C for 30 min or Soxhlet extract with methylene chloride.

5.4 Water bath—Heated, with concentric ring cover, capable of temperature control (±2 °C). The bath should be used in a hood.

5.5 GC/MS system:

5.5.1 Gas chromatograph—An analytical system complete with a temperature programmable gas chromatograph and all required accessories including syringes, analytical columns, and gases. The injection port must be designed for capillary columns. Either split, splitless, or on-column injection techniques may be employed, as long as the requirements of Section 7.1.1 are achieved.

5.5.2 Column—60 m long × 0.25 mm ID glass or fused silica, coated with SP-2330 (or equivalent) with a film thickness of 0.2 μm. Any equivalent column must resolve 2, 3, 7, 8-TCDD from the other 21 TCDD isomers.[16]

5.5.3 Mass spectrometer—Either a low resolution mass spectrometer (LRMS) or a high resolution mass spectrometer (HRMS) may be used. The mass spectrometer must be equipped with a 70 V (nominal) ion source and be capable of aquiring m/z abundance data in real time selected ion monitoring (SIM) for groups of four or more masses.

5.5.4 GC/MS interface—Any GC to MS interface can be used that achieves the requirements of Section 7.1.1. GC to MS interfaces constructed of all glass or glass-lined materials are recommended. Glass surfaces can be deactivated by silanizing with dichlorodimethylsilane. To achieve maximum sensitivity, the exit end of the capillary column should be placed in the ion source. A short piece of fused silica capillary can be used as the interface to overcome problems associated with straightening the exit end of glass capillary columns.

5.5.5 The SIM data acquired during the chromatographic program is defined as the Selected Ion Current Profile (SICP). The SICP can be acquired under computer control or as a real time analog output. If computer control is used, there must be software available to plot the SICP and report peak height or area data for any m/z in the SICP between specified time or scan number limits.

5.6 Balance—Analytical, capable of accurately weighing 0.0001 g.

6. Reagents

6.1 Reagent water—Reagent water is defined as a water in which an interferent is not observed at the MDL of 2, 3, 7, 8-TCDD.

6.2 Sodium hydroxide solution (10 N)—Dissolve 40 g of NaOH (ACS) in reagent water and dilute to 100 mL. Wash the solution with methylene chloride and hexane before use.

6.3 Sodium thiosulfate—(ACS) Granular.

6.4 Sulfuric acid—Concentrated (ACS, sp. gr. 1.84).

6.5 Acetone, methylene chloride, hexane, benzene, ortho-xylene, tetradecane—Pesticide quality or equivalent.

6.6 Sodium sulfate—(ACS) Granular, anhydrous. Purify by heating at 400 °C for 4 h in a shallow tray.

6.7 Alumina—Neutral, 80/200 mesh (Fisher Scientific Co., No. A-540 or equivalent). Before use, activate for 24 h at 130 °C in a foil-covered glass container.

6.8 Silica gel—High purity grade, 100/120 mesh (Fisher Scientific Co., No. S-679 or equivalent).

6.9 Stock standard solutions (1.00 µg/µL)—Stock standard solutimns can be prepared from pure standard materials or purchased as certified solutions. Acetone should be used as the solvent for spiking solutions; ortho-xylene is recommended for calibration standards for split injectors; and tetradecane is recommended for splitless or on-colum injectors. Analyze stock internal standards to verify the absence of native 2,3,7,8-TCDD.

6.9.1 Prepare stock standard solutions of 2,3,7,8-TCDD (mol wt 320) and either $^{37}Cl_4$ 2,3,7,8-TCDD (mol wt 328) or $^{13}Cl_{12}$ 2,3,7,8-TCDD (mol wt 332) in an isolated area by accurately weighing about 0.0100 g of pure material. Dissolve the material in pesticide quality solvent and dilute to volume in a 10-mL volumetric flask. When compound purity is assayed to be 96% or greater, the weight can be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards can be used at any concentration if they are certified by the manufacturer or by an independent source.

6.9.2 Transfer the stock standard solutions into Teflon-sealed screw-cap bottles. Store in an isolated refrigerator protected from light. Stock standard solutions should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards or spiking solutions from them.

6.9.3 Stock standard solutions must be replaced after six months, or sooner if comparison with check standards indicates a problem.

6.10 Internal standard spiking solution (25 ng/mL)—Using stock standard solution, prepare a spiking solution in acetone of either $^{13}Cl_{12}$ or $^{37}Cl_4$ 2,3,7,8-TCDD at a concentration of 25 ng/mL. (See Section 10.2)

6.11 Quality control check sample concentrate—See Section 8.2.1.

7. Calibration

7.1 Establish gas chromatograhic operating conditions equivalent to those given in Table 1 and SIM conditions for the mass spectrometer as described in Section 12.1. The GC/MS system must be calibrated using the internal standard technique.

7.1.1 Using stock standards, prepare calibration standards that will allow measurement of relative response factors of at least three concentration ratios of 2,3,7,8-TCDD to internal standard. Each calibration standard must be prepared to contain the internal standard at a concentration of 25 ng/mL. If any interferences are contributed by the internal standard at m/z 320 and 322, its concentration may be reduced in the calibration standards and in the internal standard spiking solution (Section 6.10). One of the calibration standards should contain 2,3,7,8-TCDD at a concentration near, but above, the MDL and the other 2,3,7,8-TCDD concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the GC/MS system.

7.1.2 Using injections of 2 to 5 µL, analyze each calibration standard according to Section 12 and tabulate peak height or area response against the concentration of 2,3,7,8-TCDD and internal standard. Calculate response factors (RF) for 2,3,7,8-TCDD using Equation 1.

$$RF = \frac{(A_s)(C_{is})}{(A_{is})(C_s)}$$

Equation

where:

A_s=SIM response for 2,3,7,8-TCDD at m/z 320.

A_{is}=SIM response for the internal standard, m/z 332 for $^{13}C_{12}$ 2,3,7,8-TCDD and m/z 328 for $^{37}Cl_4$ 2,3,7,8-TCDD.

C_{is}=Concentration of the internal standard (µg/L).

C_s=Concentration of 2,3,7,8-TCDD (µg/L).

If the RF value over the working range is constant (< 10% relative standard deviation, RSD), the RF can be assumed to be invariant and the average RF can be used for calculations. Alternatively, the results can be used to plot a calibration curve of response ratios, A_s/A_{is}, vs. RF.

7.1.3 The working calibration curve or RF must be verified on each working day by the measurement of one or more 2,3,7,8-TCDD calibration standards. If the response for 2,3,7,8-TCDD varies from the predicted response by more than ±15%, the test must be repeated using a fresh calibration standard. Alternatively, a new calibration curve must be prepared.

7.2 Before using any cleanup procedure, the analyst must process a series of calibration standards through the procedure to validate elution patterns and the absence of interferences from the reagents.

8. Quality Control

8.1 Each laboratory that uses this method is required to operate a formal quality control program. The minimum requirements of this program consist of an initial demonstration of laboratory capability and an ongoing analysis of spiked samples to evaluate and document data quality. The laboratory must maintain records to document the quality of data that is generated. Ongoing data quality checks are compared with established performance criteria to determine if the results of analyses meet the performance characteristics of the method. When results of sample spikes indicate atypical method performance, a quality control check standard must be analyzed to confirm that the measurements were performed in an in-control mode of operation.

8.1.1 The analyst must make an initial, one-time, demonstration of the ability to generate acceptable accuracy and precision with this method. This ability is established as described in Section 8.2.

8.1.2 In recognition of advances that are occurring in chromatography, the analyst is permitted certain options (detailed in Secions 10.5, 11.1, and 12.1) to improve the separations or lower the cost of measurements. Each time such a modification is made to he method, the analyst is required to epeat the procedure in Section 8.2

8.1.3 Before processing any samples, the nalyst must analyze a reagent water blank o demonstrate that interferences from the nalytical system and glassware are under ontrol. Each time a set of samples is exracted or reagents are changed, a reagent ater blank must be processed as a safeuard against laboratory contamination.

8.1.4 The laboratory must, on an ongoing asis, spike and analyze a minimum of 10% f all samples with native 2,3,7,8-TCDD to onitor and evaluate laboratory data qualy. This procedure is described in Section 3.

8.1.5 The laboratory must, on an ongoing asis, demonstrate through the analyses of ality control check standards that the operation of the measurement system is in control. This procedure is described in Section 8.4. The frequency of the check standard analyses is equivalent to 10% of all samples analyzed but may be reduced if spike recoveries from samples (Section 8.3) meet all specified quality control criteria.

8.1.6 The laboratory must maintain performance records to document the quality of data that is generated. This procedure is described in Section 8.5.

8.2 To establish the ability to generate acceptable accuracy and precision, the analyst must perform the following operations.

8.2.1 A quality control (QC) check sample concentrate is required containing 2,3,7,8-TCDD at a concentration of 0.100 μg/mL in acetone. The QC check sample concentrate must be obtained from the U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory in Cincinnati, Ohio, if available. If not available from that source, the QC check sample concentrate must be obtained from another external source. If not available from either source above, the QC check sample concentrate must be prepared by the laboratory using stock standards prepared independently from those used for calibration.

8.2.2 Using a pipet, prepare QC check samples at a concentration of 0.100 μg/L (100 ng/L) by adding 1.00 mL of QC check sample concentrate to each of four 1-L aliquots of reagent water.

8.2.3 Analyze the well-mixed QC check samples according to the method beginning in Section 10.

8.2.4 Calculate the average recovery ($\bar{X}$) in μg/L, and the standard deviation of the recovery (s) in μg/L, for 2,3,7,8-TCDD using the four results.

8.2.5 Compare s and ($\bar{X}$) with the corresponding acceptance criteria for precision and accuracy, respectively, found in Table 2. If s and $\bar{X}$ meet the acceptance criteria, the system performance is acceptable and analysis of actual samples can begin. If s exceeds the precision limit or $\bar{X}$ falls outside the range for accuracy, the system performance is unacceptable for 2,3,7,8-TCDD. Locate and correct the source of the problem and repeat the test beginning with Section 8.2.2.

8.3 The laboratory must, on an ongoing basis, spike at least 10% of the samples from each sample site being monitored to assess accuracy. For laboratories analyzing one to ten samples per month, at least one spiked sample per month is required.

8.3.1 The concentration of the spike in the sample should be determined as follows:

8.3.1.1 If, as in compliance monitoring, the concentration of 2,3,7,8-TCDD in the sample is being checked against a regulatory concentration limit, the spike should be at that limit or 1 to 5 times higher than the background concentration determined in

Section 8.3.2, whichever concentration would be larger.

8.3.1.2 If the concentration of 2,3,7,8-TCDD in the sample is not being checked against a limit specific to that parameter, the spike should be at 0.100 μg/L or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.3 If it is impractical to determine background levels before spiking (e.g., maximum holding times will be exceeded), the spike concentration should be (1) the regulatory concentration limit, if any; or, if none (2) the larger of either 5 times higher than the expected background concentration or 0.100 μg/L.

8.3.2 Analyze one sample aliquot to determine the background concentration (B) of 2,3,7,8-TCDD. If necessary, prepare a new QC check sample concentrate (Section 8.2.1) appropriate for the background concentration in the sample. Spike a second sample aliquot with 1.0 mL of the QC check sample concentrate and analyze it to determine the concentration after spiking (A) of 2,3,7,8-TCDD. Calculate percent recovery (P) as 100(A−B)%T, where T is the known true value of the spike.

8.3.3 Compare the percent recovery (P) for 2,3,7,8-TCDD with the corresponding QC acceptance criteria found in Table 2. These acceptance criteria were calculated to include an allowance for error in measurement of both the background and spike concentrations, assuming a spike to background ratio of 5:1. This error will be accounted for to the extent that the analyst's spike to background ratio approaches 5:1.[11] If spiking was performed at a concentration lower than 0.100 μg/L, the analyst must use either the QC acceptance criteria in Table 2, or optional QC acceptance criteria calculated for the specific spike concentration. To calculate optional acceptance criteria for the recovery of 2,3,7,8-TCDD: (1) Calculate accuracy (X') using the equation in Table 3, substituting the spike concentration (T) for C; (2) calculate overall precision (S') using the equation in Table 3, substituting X' for X; (3) calculate the range for recovery at the spike concentration as (100 X'/T)±2.44(100 S'/T)%. [11]

8.3.4 If the recovery of 2,3,7,8-TCDD falls outside the designated range for recovery, a check standard must be analyzed as described in Section 8.4.

8.4 If the recovery of 2,3,7,8-TCDD fails the acceptance criteria for recovery in Section 8.3, a QC check standard must be prepared and analyzed.

NOTE: The frequency for the required analysis of a QC check standard will depend upon the complexity of the sample matrix and the performance of the laboratory.

8.4.1 Prepare the QC check standard by adding 1.0 mL of QC check sample concentrate (Section 8.2.1 or 8.3.2) to 1 L of reagent water.

8.4.2 Analyze the QC check standard to determine the concentration measured (A) of 2,3,7,8-TCDD. Calculate the percent recovery (P_s) as 100 (A/T)%, where T is the true value of the standard concentration.

8.4.3 Compare the percent recovery (P_s) with the corresponding QC acceptance criteria found in Table 2. If the recovery of 2,3,7,8-TCDD falls outside the designated range, the laboratory performance is judged to be out of control, and the problem must be immediately identified and corrected. The analytical result for 2,3,7,8-TCDD in the unspiked sample is suspect and may not be reported for regulatory compliance purposes.

8.5 As part of the QC program for the laboratory, method accuracy for wastewater samples must be assessed and records must be maintained. After the analysis of five spiked wastewater samples as in Section 8.3, calculate the average percent recovery ($\hat{P}$) and the spandard deviation of the percent recovery (s_p). Express the accuracy assessment as a percent recovery interval from $\hat{P}-2s_p$ to $\hat{P}+2s_p$. If $\hat{P}=90\%$ and $s_p=10\%$, for example, the accuracy interval is expressed as 70–110%. Update the accuracy assessment on a regular basis (e.g. after each five to ten new accuracy measurements).

8.6 It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Field duplicates may be analyzed to assess the precision of the environmental measurements. Whenever possible, the laboratory should analyze standard reference materials and participate in relevant performance evaluation studies.

9. Sample Collection, Preservation, and Handling

9.1 Grab samples must be collected in glass containers. Conventional sampling practices [13] should be followed, except that the bottle must not be prerinsed with sample before collection. Composite samples should be collected in refrigerated glass containers in accordance with the requirements of the program. Automatic sampling equipment must be as free as possible of Tygon tubing and other potential sources of contamination.

9.2 All samples must be iced or refrigerated at 4 °C and protected from light from the time of collection until extraction. Fill the sample bottles and, if residual chlorine is present, add 80 mg of sodium thiosulfate per liter of sample and mix well. EPA Methods 330.4 and 330.5 may be used for mea-urement of residual chlorine.[13] Field test kits are available for this purpose.

9.3 Label all samples and containers "POISON" and ship according to applicable U.S. Department of Transportation regulations.

9.4 All samples must be extracted within 7 days of collection and completely analyzed within 40 days of extraction.[2]

10. Sample Extraction

Caution: When using this method to analyze for 2,3,7,8-TCDD, all of the following operations must be performed in a limited-access laboratory with the analyst wearing full protective covering for all exposed skin surfaces. See Section 4.2.

10.1 Mark the water meniscus on the side of the sample bottle for later determination of sample volume. Pour the entire sample into a 2-L separatory funnel.

10.2 Add 1.00 mL of internal standard spiking solution to the sample in the separatory funnel. If the final extract will be concentrated to a fixed volume below 1.00 mL (Section 12.3), only that volume of spiking solution should be added to the sample so that the final extract will contain 25 ng/mL of internal standard at the time of analysis.

10.3 Add 60 mL of methylene chloride to the sample bottle, seal, and shake 30 s to rinse the inner surface. Transfer the solvent to the separatory funnel and extract the sample by shaking the funnel for 2 min. with periodic venting to release excess pressure. Allow the organic layer to separate from the water phase for a minimum of 10 min. If the emulsion interface between layers is more than one-third the vmlume of the solvent layer, the analyst must employ mechanical techniques to complete the phase separation. The optimum technique depends upon the sample, but may include stirring, filtration of the emulsion through glass wool, centrifugation, or other physical methods. Collect the methylene chloride extract in a 250-mL Erlenmeyer flask.

10.4 Add a second 60-mL volume of methylene chloride to the sample bottle and repeat the extraction procedure a second time, combining the extracts in the Erlenmeyer flask. Perform a third extraction in the same manner.

10.5 Assemble a Kuderna-Danish (K-D) concentrator by attaching a 10-mL concentrator tube to a 500-mL evaporative flask. Other concentration devices or techniques may be used in place of the K-D concentrator if the requirements of Section 8.2 are met.

10.6 Pour the combined extract into the K-D concentrator. Rinse the Erlenmeyer flask with 20 to 30 mL of methylele chloride to complete the quantitative transfer.

10.7 Add one or two clean boiling chips to the evaporative flask and attach a three-ball Snyder column. Prewet the Snyder column by adding about 1 mL of methylene chloride to the top. Place the K-D apparatus on a hot water bath (60 to 65 °C) so that the concentrator tube is partially immersed in the hot water, and the entire lower rounded surface of the flask is bathed with hot vapor. Adjust the vertical position of the apparatus and the water temperature as required to complete the concentration in 15 to 20 min. At the proper rate of distillation the balls of the column will actively chatter but the chambers will not flood with condensed solvent. When the apparent volume of liquid reaches 1 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 min.

10.8 Momentarily remove the Snyder column, add 50 mL of hexane and a new boiling chip, and reattach the Snyder column. Raise the temperature of the water bath to 85 to 90°C. Concentrate the extract as in Section 10.7, except use hexane to prewet the column. Remove the Snyder column and rinse the flask and its lower joint into the concentrator tube with 1 to 2 mL of hexane. A 5-mL syringe is recommended for this operation. Set aside the K-D glassware for reuse in Section 10.14.

10.9 Pour the hexane extract from the concentrator tube into a 125-mL separatory funnel. Rinse the concentrator tube four times with 10-mL aliquots of hexane. Combine all rinses in the 125-mL separatory funnel.

10.10 Add 50 mL of sodium hydroxide solution to the funnel and shake for 30 to 60 s. Discard the aqueous phase.

10.11 Perform a second wash of the organic layer with 50 mL of reagent water. Discard the aqueous phase.

10.12 Wash the hexane layer with a least two 50-mL aliquots of concentrated sulfuric acid. Continue washing the hexane layer with 50-mL aliquots of concentrated sulfuric acid until the acid layer remains colorless. Discard all acid fractions.

10.13 Wash the hexane layer with two 50-mL aliquots of reagent water. Discard the aqueous phases.

10.14 Transfer the hexane extract into a 125-mL Erlenmeyer flask containing 1 to 2 g of anhydrous sodium sulfate. Swirl the flask for 30 s and decant the hexane extract into the reassembled K-D apparatus. Complete the quantitative transfer with two 10-mL hexane rinses of the Erlenmeyer flask.

10.15 Replace the one or two clean boiling chips and concentrate the extract to 6 to 10 mL as in Section 10.8.

10.16 Add a clean boiling chip to the concentrator tube and attach a two-ball micro-Snyder column. Prewet the column by adding about 1 mL of hexane to the top. Place the micro-K-D apparatus on the water bath so that the concentrator tube is partially immersed in the hot water. Adjust the vertical position of the apparatus and the water temperature as required to complete the concentration in 5 to 10 min. At the proper rate of distillation the balls of the column will actively chatter but the chambers will not flood. When the apparent volume of liquid reaches about 0.5 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 min. Remove the micro-Snyder column and rinse its lower joint into the concentrator tube with 0.2 mL of hexane.

Adjust the extract volume to 1.0 mL with hexane. Stopper the concentrator tube and store refrigerated and protected from light if further processing will not be performed immediately. If the extract will be stored longer than two days, it should be transferred to a Teflon-sealed screw-cap vial. If the sample extract requires no further cleanup, proceed with GC/MS analysis (Section 12). If the sample requires further cleanup, proceed to Section 11.

10.17 Determine the original sample volume by refilling the sample bottle to the mark and transferring the liquid to a 1000-mL graduated cylinder. Record the sample volume to the nearest 5 mL.

11. Cleanup and Separation

11.1 Cleanup procedures may not be necessary for a relatively clean sample matrix. If particular circumstances demand the use of a cleanup procedure, the analyst may use either procedure below or any other appropriate procedure.[1,5,7] However, the analyst first must demonstrate that the requirements of Section 8.2 can be met using the method as revised to incorporate the cleanup procedure. Two cleanup column options are offered to the analyst in this section. The alumina column should be used first to overcome interferences. If background problems are still encountered, the silica gel column may be helpful.

11.2 Alumina column cleanup for 2,3,7,8-TCDD:

11.2.1 Fill a 300 mm long x 10 mm ID chromatographic column with activated alumina to the 150 mm level. Tap the column gently to settle the alumina and add 10 mm of anhydrous sodium sulfate to the top.

11.2.2 Preelute the column with 50 mL of hexane. Adjust the elution rate to 1 mL/min. Discard the eluate and just prior to exposure of the sodium sulfate layer to the air quantitatively transfer the 1.0-mL sample extract onto the column using two 2-mL portions of hexane to complete the transfer.

11.2.3 Just prior to exposure of the sodium sulfate layer to the air, add 50 mL of 3% methylene chloride/95% hexane (V/V) and continue the elution of the column. Discard the eluate.

11.2.4 Next, elute the column with 50 mL of 20% methylene chloride/80% hexane (V/V) into a 500-mL K-D flask equipped with a 10-mL concentrator tube. Concentrate the collected fraction to 1.0 mL as in Section 10.16 and analyze by GC/MS (Section 12).

11.3 Silica gel column cleanup for 2,3,7,8-TCDD:

11.3.1 Fill a 400 mm long x 11 mm ID chromatmgraphic column with silica gel to the 300 mm level. Tap the column gently to settle the silica gel and add 10 mm of anhydrous sodium sulfate to the top.

11.3.2 Preelute the column with 50 mL of 20% benzene/80% hexane (V/V). Adjust the elution rate to 1 mL/min. Discard the eluate and just prior to exposure of the sodium sulfate layer to the air, quantitatively transfer the 1.0-mL sample extract onto the column using two 2-mL portions of 20% benzene/80% hexane to complete the transfer.

11.3.3 Just prior to exposure of the sodium sulfate layer to the air, add 40 mL of 20% benzene/80% hexane to the column. Collect the eluate in a clean 500-mL K-D flask equipped with a 10-mL concentrator tube. Concentrate the collected fraction to 1.0 mL as in Section 10.16 and analyze by GC/MS.

12. GC/MS Analysis

12.1 Table 1 summarizes the recommended operating conditions for the gas chromatograph. Included in this table are retention times and MDL that can be achieved under these conditions. Other capillary columns or chromatographic conditions may be used if the requirements of Sections 5.5.2 and 8.2 are met.

12.2 Analyze standards and samples with the mass spectrometer operating in the selected ion monitoring (SIM) mode using a dwell time to give at least seven points per peak. For LRMS, use masses at m/z 320, 322, and 257 for 2,3,7,8-TCDD and either m/z 328 for $^{37}\mathrm{Cl}_4$ 2,3,7,8-TCDD or m/z 332 for $^{13}\mathrm{C}_{12}$ 2,3,7,8-TCDD. For HRMS, use masses at m/z 319.8965 and 321.8936 for 2,3,7,8-TCDD and either m/z 327.8847 for $^{37}\mathrm{Cl}_4$ 2,3,7,8-TCDD or m/z 331.9367 for $^{13}\mathrm{C}_{12}$ 2,3,7,8-TCDD.

12.3 If lower detection limits are required, the extract may be carefully evaporated to dryness under a gentle stream of nitrogen with the concentrator tube in a water bath at about 40 °C. Conduct this operation immediately before GC/MS analysis. Redissolve the extract in the desired final volume of ortho-xylene or tetradecane.

12.4 Calibrate the system daily as described in Section 7.

12.5 Inject 2 to 5 μL of the sample extract into the gas chromatograph. The volume of calibration standard injected must be measured, or be the same as all sample injection volumes.

12.6 The presence of 2,3,7,8-TCDD is qualitatively confirmed if all of the following criteria are achieved:

12.6.1 The gas chromatographic column must resolve 2,3,7,8-TCDD from the other 21 TCDD isomers.

12.6.2 The masses for native 2,3,7,8-TCDD (LRMS-m/z 320, 322, and 257 and HRMS-m/z 320 and 322) and labeled 2,3,7,8-TCDD (m/z 328 or 332) must exhibit a simultaneous maximum at a retention time that matches that of native 2,3,7,8-TCDD in the calibration standard, with the performance specifications of the analytical system.

12.6.3 The chlorine isotope ratio at m/z 320 and m/z 322 must agree to within ±10% of that in the calibration standard.

12.6.4 The signal of all peaks must be greater than 2.5 times the noise level.

12.7 For quantitation, measure the response of the m/z 320 peak for 2,3,7,8-TCDD and the m/z 332 peak for $^{13}C_{12}$ 2,3,7,8-TCDD or the m/z 328 peak for $^{37}Cl_4$ 2,3,7,8-TCDD.

12.8 Co-eluting impurities are suspected if all criteria are achieved except those in Section 12.6.3. In this case, another SIM analysis using masses at m/z 257, 259, 320 and either m/a 328 or m/z 322 can be performed. The masses at m/z 257 and m/z 259 are indicative of the loss of one chlorine and one carbonyl group from 2,3,7,8-TCDD. If masses m/z 257 and m/z 259 give a chlorine isotope ratio that agrees to within ±10% of the same cluster in the calibration standards, then the presence of TCDD can be confirmed. Co-eluting DDD, DDE, and PCB residues can be confirmed, but will require another injection using the appropriate SIM masses or full repetitive mass scans. If the response for $^{37}Cl_4$ 2,3,7,8-TCDD at m/z 328 is too large, PCB contamination is suspected and can be confirmed by examining the response at both m/z 326 and m/z 328. The $^{37}Cl_4$ 2,3,7,8-TCDD internal standard gives negligible response at m/z 326. These pesticide residues can be removed using the alumina column cleanup procedure.

12.9 If broad background interference restricts the sensitivity of the GC/MS analysis, the analyst should employ additional cleanup procedures and reanalyze by GC/MS.

12.10 In those circumstances where these procedures do not yield a definitive conclusion, the use of high resolution mass spectrometry is suggested.[5]

13. Calculations

13.1 Calculate the concentration of 2,3,7,8-TCDD in the sample using the response factor (RF) determined in Section 7.1.2 and Equation 2.

$$\text{Concentration } (\mu g/L) = \frac{(A_s)(I_s)}{(A_{is})(RF)(V_o)}$$

Equation 2

where:

A_s=SIM response for 2,3,7,8-TCDD at m/z 320.

A_{is}=SIM response for the internal standard at m/z 328 or 332.

I_s=Amount of internal standard added to each extract (μg).

V_o=Volume of water extracted (L).

13.2 For each sample, calculate the percent recovery of the internal standard by comparing the area of the m/z peak measured in the sample to the area of the same peak in the calibration standard. If the recovery is below 50%, the analyst should review all aspects of his analytical technique.

13.3 Report results in μg/L without correction for recovery data. All QC data obtained should be reported with the sample results.

14. Method Performance

14.1 The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero.[1] The MDL concentration listed in Table 1 was obtained using reagent water.[14] The MDL actually achieved in a given analysis will vary depending on instrument sensitivity and matrix effects.

14.2 This method was tested by 11 laboratories using reagent water, drinking water, surface water, and three industrial wastewaters spiked at six concentrations over the range 0.02 to 0.20 μg/L.[15] Single operator precision, overall precision, and method accuracy were found to be directly related to the concentration of the parameter and essentially independent of the sample matrix. Linear equations to describe these relationships are presented in Table 3.

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TABLE 1.—Chromatographic Conditions and Method Detection Limit

Parameter	Retention time (min)	Method detection limit (µg/L)
2,3,7,8-TCDD	13.1	0.002

Column conditions: SP-2330 coated on a 60 m long x 0.25 mm ID glass column with hydrogen carrier gas at 40 cm/sec linear velocity, splitless injection using tetradecane. Column temperature held isothermal at 200°C for 1 min, then programmed at 8°C/min to 250 °C and held. Use of helium carrier gas will approximately double the retention time.

TABLE 2.—QC Acceptance Criteria—Method 613

Parameter	Test conc. (µg/L)	Limit for s (µg/L)	Range for $\bar{X}$ (µg/L)	Range for P, P_s (%)
2,3,7,8-TCDD	0.100	0.0276	0.0523–0.1226	45-129

s=Standard deviation of four recovery measurements, in µg/L (Section 8.2.4).

$\bar{X}$=Average recovery for four recovery measurements, in µg/L (Section 8.2.4).

P, P_s=Percent recovery measured (Section 8.3.2, Section 8.4.2).

NOTE: These criteria are based directly upon the method performance data in Table 3. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table 3.

TABLE. 3.—METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION—METHOD 613

Parameter	Accuracy, as recovery, X' (µg/L)	Single analyst, precision, s_r' (µ/L)	Overall precision, S' (µ/g/L)
2,3,7,8-TCDD	0.86C+0.00145	$0.13\bar{X}+0.00129$	$0.19\bar{X}+0.00028$

X'=Expected recovery for one or more measurements. of a sample containing a concentration of C, in µg/L
s_r'=Expected single analyst standard deviation of measurements at an average concentration found of $\bar{X}$, in µg/L
S'=Expected interlaboratory standard deviation of measurements at an average concentration found of $\bar{X}$, in µg/L
C=True value for the concentration, in µg/L.
$\bar{X}$=Average recovery found for measurements of samples containing a concentration of C, in µg/L.

METHOD 624—PURGEABLES

1. Scope and Application

1.1 This method covers the determination of a number of purgeable organics. The following parameters may be determined by this method:

Parameter	STORET No.	CAS No.
Benzene	34030	71–43–2
Bromodichloromethane	32101	75–27–4
Bromoform	32104	75–25–2
Bromomethane	34413	74–83–9
Carbon tetrachloride	32102	56–23–5
Chlorobenzene	34301	108–90–7
Chloroethane	34311	75–00–3
2-Chloroethylvinyl ether	34576	110–75–8
Chloroform	32106	67–66–3
Chloromethane	34418	74–87–3
Dibromochloromethane	32105	124–48–1
1,2-Dichlorobenzene	34536	95–50–1
1,3-Dichlorobenzene	34566	541–73–1
1,4-Dichlorobenzene	34571	106–46–7
1,1-Dichloroethane	34496	75–34–3
1,2-Dichloroethane	34531	107–06–2
1,1-Dichloroethane	34501	75–35–4
trans-1,2-Dichloroethene	34546	156–60–5
1,2-Dichloropropane	34541	78–87–5
cis-1,3-Dichloropropene	34704	10061–01–5
trans-1,3-Dichloropropene	34699	10061–02–6
Ethyl benzene	34371	100–41–4
Methylene chloride	34423	75–09–2
1,1,2,2-Tetrachloroethane	34516	79–34–5
Tetrachloroethene	34475	127–18–4
Toluene	34010	108–88–3
1,1,1-Trichloroethene	34506	71–55–6
1,1,2-Trichloroethene	34511	79–00–5
Trichloroethane	39180	79–01–6
Trichlorofluoromethane	34488	75–69–4
Vinyl chloride	39175	75–01–4

1.2 The method may be extended to screen samples for acrolein (STORET No. 34210, CAS No. 107-02-8) and acrylonitrile (STORET No. 34215, CAS No. 107-13-1), however, the preferred method for these two compounds in Method 603.

1.3 This is a purge and trap gas chromatographic/mass spectrometer (GC/MS) method applicable to the determination of the compounds listed above in municipal and industrial discharges as provided under 40 CFR 136.1.

1.4 The method detection limit (MDL, defined in Section 14.1)[1] for each parameter is listed in Table 1. The MDL for a specific wastewater may differ from those listed, depending upon the nature of interferences in the sample matrix.

1.5 Any modification to this method, beyond those expressly permitted, shall be considered as a major modification subject to application and approval of alternate test procedures under 40 CFR 136.4 and 136.5. Depending upon the nature of the modification and the extent of intended use, the applicant may be required to demonstrate that the modifications will produce equivalent results when applied to relevant wastewaters.

1.6 This method is restricted to use by or under the supervision of analysts experienced in the operation of a purge and trap system and a gas chromatograph/mass spectrometer and in the interpretation of mass spectra. Each analyst must demonstrate the ability to generate acceptable results with this method using the procedure described in Section 8.2.

2. Summary of Method

2.1 An inert gas is bubbled through a 5-mL water sample contained in a specially-designed purging chamber at ambient temperature. The purgeables are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent trap where the purgeables are trapped. After purging is completed, the trap is heated and backflushed with the inert gas to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeables which are then detected with a mass spectrometer.[2,3]

3. Interferences

3.1 Impurities in the purge gas, organic compounds outgassing from the plumbing ahead of the trap, and solvent vapors in the laboratory account for the majority of contamination problems. The analytical system must be demonstated to be free from contamination under the conditions of the analysis by running laboratory reagent blanks as described in Section 8.1.3. The use of non-Teflon plastic tubing, non-Teflon thread sealants, or flow controllers with rubber components in the purge and trap system should be avoided.

3.2 Samples can be contaminated by diffusion of volatile organics (particularly fluorocarbons and methylene chloride) through the septum seal into the sample during shipment and storage. A field reagent blank prepared from reagent water and carried through the sampling and handling protocol can serve as a check on such contamination.

3.3 Contamination by carry-over can occur whenever high level and low level samples are sequentially analyzed. To reduce carry-over, the purging device and sample syringe must be rinsed with reagent water between sample analyses. Whenever an unusually concentrated sample is encountered, it should be followed by an analysis of reagent water to check for cross contamination. For samples containing large amounts of water-soluble materials, suspended solids, high boiling compounds or high pureeable levels, it may be necessary to wash the purging device with a detergent solution, rinse it with distilled water, and then dry it in a 105 ° C oven between analyses. The trap and other parts of the system are also subject to contamination; therefore, frequent bakeout and purging of the entire system may be required.

4. Safety

4.1 The toxicity or carcinogenicity of each reagent used in this method has not been precisely defined; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this methmd. A reference file of material data handling sheets should also be made available to all personnel involved in the chemical analysis. Additional references to laboratory safety are available and have been identified[4-6] for the information of the analyst.

4.2. The following parameters covered by this method have been tentatively classified as known or suspected, human or mammalian carcinogens: benzene, carbon tetrachloride, chloroform, 1,4-dichlorobenzene, and vinyl chloride. Primary standards of these toxic compounds should be prepared in a hood. A NIOSH/MESA approved toxic gas respirator should be worn when the analyst handles high concentrations of these toxic compounds.

5. Apparatus and Materials

5.1 Sampling equipment, for discrete sampling.

5.1.1 Vial—25-mL capacity or larger, equipped with a screw cap with a hole in the center (Pierce #13075 or equivalent). Detergent wash, rinse with tap and distilled water, and dry at 105 °C before use.

5.1.2 Septum—Teflon-faced silicane (Pierce #12722 or equivalent). Detergent wash, rinse with tap and distilled water, and dry at 105 °C for 1 h before use.

5.2 Purge and trap system—The purge and trap system consists of three separate pieces of equipment: A purging device, trap, and desorber. Several complete systems are now commercially available.

5.2.1 The purging device must be designed to accept 5-mL samples with a water column at least 3 cm deep. The gaseous head space between the water column and the trap must have a total volume of less than 15 mL. The purge gas must pass though the water column as finely divided bubbles with a diameter of less than 3 mm at the origin. The purge gas must be introduced no more than 5 mm from the base of the water column. The purging device illustrated in Figure 1 meets these design criteria.

5.2.2 The trap must be at least 25 cm long and have an inside diameter of at least 0.105 in. The trap must be packed to contain the following minimum lengths of adsorbents: 1.0 cm of methyl silicone coated packing (Section 6.3.2), 15 cm of 2,6-dyphenylene oxide polymer (Section 6.3.1), and 8 cm of silica gel (Section 6.3.3). The minimum specifications for the trap are illustrated in Figure 2.

5.2.3 The desorber should be capable of rapidly heating the trap to 180 °C. The polymer section of the trap should not be heated higher than 180 °C and the remaining sections should not exceed 200 °C. The desorber illustrated in Figure 2 meets these design criteria.

5.2.4 The purge and trap system may be assembled as a separate unit or be coupled to a gas chromatograph as illustrated in Figures 3 and 4.

5.3 GC/MS system:

5.3.1 Gas chromatograph—An analytical system complete with a temperature programmable gas chromatograph suitable for on-column injection and all required accessories including syringes, analytical columns, and gases.

5.3.2 Column—6 ft long x 0.1 in ID stainless steel or glass, packed with 1% SP-1000 on Carbopack B (60/80 mesh) or equivalent. This column was used to develop the method performance statements in Section 14. Guidelines for the use of alternate column packings are provided in Section 11.1.

5.3.3 Mass spectrometer—Capable of scanning from 20 to 260 amu every 7 s or less, utilizing 70 V (nominal) electron energy in the electron impact ionization mode, and producing a mass spectrum which meets all the criteria in Table 2 when 50 ng of 4-bromofluorobenzene (BFB) is injected through the GC inlet.

5.3.4 GC/MS interface—Any GC to MS interface that gives acceptable calibration points at 50 ng or less per injection for each of the parameters of interest and achieves all acceptable performance criteria (Section 10) may be used. GC to MS interfaces constructed of all glass or glass-lined materials are recommended. Glass can be deactivated by silanizing with dichlorodimethylsilane.

5.3.5 Data system—A computer system must be interfaced to the mass spectrometer that allows the continuous acquisition and storage on machine-readable media of all mass spectra obtained throughout the duration of the chromatographic program. The computer must have software that allows searching any GC/MS data file for specific m/z (masses) and plotting such m/z abundances versus time or scan number. This type of plot is defined as an Extracted Ion Current Profile (EICP). Software must also be available that allows integrating the abundance in any EICP between specified time or scan number limits.

5.4 Syringes—5-mL, glass hypodermic with Luerlok tip (two each), if applicable to the purging device.

5.5 Micro syringes—25-µL, 0.006 in. ID needle.

5.6 Syringe valve—2-way, with Luer ends (three each).

5.7 Syringe—5-mL, gas-tight with shut-off valve.

5.8 Bottle—15-mL, screw-cap, with Teflon cap liner.

5.9 Balance—Analytical, capable of accurately weighing 0.0001 g.

6. Reagents

6.1 Reagent water—Reagent water is defined as a water in which an interferent is not observed at the MDL of the parameters of interest.

6.1.1 Reagent water can be generated by passing tap water through a carbon filter bed containing about 1 lb of activated carbon (Filtrasorb-300, Calgon Corp., or equivalent).

6.1.2 A water purification system (Millipore Super-Q or equivalent) may be used to generate reagent water.

6.1.3 Reagent water may also be prepared by boiling water for 15 min. Subsequently, while maintaining the temperature at 90 °C, bubble a contaminant-free inert gas through the water for 1 h. While still hot, transfer the water to a narrow mouth screw-cap bottle and seal with a Teflon-lined septum and cap.

6.2 Sodium thiosulfate—(ACS) Granular.

6.3 Trap materials:

6.3.1 2,6-Diphenylene oxide polymer—Tenax, (60/80 mesh), chromatographic grade or equivalent.

6.3.2 Methyl silicone packing—3% OV-1 on Chromosorb-W (60/80 mesh) or equivalent.

6.3.3 Silica gel—35/60 mesh, Davison, grade-15 or equivalent.

6.4 Methanol—Pesticide quality or equivalent.

6.5 Stock standard solutions—Stock standard solutions may be prepared from pure standard materials or purchased as certified solutions. Prepare stock standard solutions in methanol using assayed liquids or gases as appropriate. Because of the toxicity of some of the compounds, primary dilutions of these materials should be prepared in a hood. A NIOSH/MESA approved toxic gas respirator should be used when the analyst handles high concentrations of such materials.

6.5.1 Place about 9.8 mL of methanol into a 10-mL ground glass stoppered volumetric flask. Allow the flask to stand, unstoppered, for about 10 min or until all alcohol wetted surfaces have dried. Weigh the flask to the nearest 0.1 mg.

6.5.2 Add the assayed reference material:

6.5.2.1 Liquids—Using a 100-µL syringe, immediately add two or more drops of assayed reference material to the flask, then reweigh. Be sure that the drops fall directly into the alcohol without contacting the neck of the flask.

6.5.2.2 Gases—To prepare standards for any of the four halocarbons that boil below 30 °C (bromomethane, chloroethane, chloromethane, and vinyl chloride), fill a 5-mL valved gas-tight syringe with the reference standard to the 5.0-mL mark. Lower the needle to 5 mm above the methanol meniscus. Slowly introduce the reference standard above the surface of the liquid (the heavy gas will rapidly dissolve in the methanol).

6.5.3 Reweigh, dilute to volume, stopper, then mix by inverting the flask several times. Calculate the concentration in µg/µL from the net gain in weight. When compound purity is assayed to be 96% or greater, the weight may be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards may be used at any concentration if they are certified by the manufacturer or by an independent source.

6.5.4 Transfer the stock standard solution into a Teflon-sealed screw-cap bottle. Store, with minimal headspace, at −10 to −20 °C and protect from light.

6.5.5 Prepare fresh standards weekly for the four gases and 2-chloroethylvinyl ether. All other standards must be replaced after one month, or sooner if comparison with check standards indicates a problem.

6.6 Secondary dilution standards—Using stock solutions, prepare secondary dilution standards in methanol that contain the compounds of interest, either singly or mixed together. The secondary dilution standards should be prepared at concentrations such that the aqueous calibration standards prepared in Section 7.3 will bracket the working range of the analytical system. Secondary dilution standards should be stored with minimal headspace and should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

6.7 Surrogate standard spiking solution—Select a minimum of three surrogate compounds from Table 3. Prepare stock standard solutions for each surrogate standard in methanol as described in Section 6.5. Prepare a surrogate standard spiking solution from these stock standards at a concentration of 15 µg/mL in water. Store the solutions at 4 °C in Teflon-sealed glass containers with a minimum of headspace. The solutions should be checked frequently for stability. The addition of 10 µL of this solution of 5 mL of sample or standard is equivalent to a concentration of 30 µg/L of each surrogate standard.

6.8 BFB Standard—Prepare a 25 µg/mL solution of BFB in methanol.

6.9 Quality control check sample concentrate—See Section 8.2.1.

7. Calibration

7.1 Assemble a purge and trap system that meets the specifications in Section 5.2. Condition the trap overnight at 180 °C by backflushing with an inert gas flow of at least 20 mL/min. Condition the trap for 10 min once daily prior to use.

7.2 Connect the purge and trap system to a gas chromatograph. The gas chromatograph must be operated using temperature and flow rate conditions equivalent to those given in Table 1.

7.3 Internal standard calibration procedure—To use this approach, the analyst must select three or more internal standards that are similar in analytical behavior to the compounds of interest. The analyst must further demonstrate that the measurement of the internal standard is not affected by method or matrix interferences. Some recommended internal standards are listed in Table 3.

7.3.1 Prepare calibration standards at a minimum of three concentration levels for each parameter by carefully adding 20.0 µL of one or more secondary dilution standards to 50, 250, or 500 mL of reagent water. A 25-µL syringe with a 0.006 in. ID needle should be used for this operation. One of the calibration standards should be at a concentration near, but above, the MDL (Table 1) and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the GC/MS system. These aqueous standards can be stored up to 24 h, if held in sealed vials with zero headspace as described in Section 9.2. If not so stored, they must be discarded after 1 h.

7.3.2 Prepare a spiking solution containing each of the internal standards using the procedures described in Sections 6.5 and 6.6. It is recommended that the secondary dilution standard be prepared at a concentration of 15 µg/mL of each internal standard compound. The addition of 10 µL of this standard to 5.0 mL of sample or calibration standard would be equivalent to 30 µg/L.

7.3.3 Analyze each calibration standard according to Section 11, adding 10 µL of internal standard spiking solution directly to the syringe (Section 11.4). Tabulate the area response of the characteristic m/z against concentration for each compound and internal standard, and calculate response factors (RF) for each compound using Equation 1.

$$RF = \frac{(A_s)(C_{is})}{(A_{is})(C_s)}$$

Equation 1

where:

A_s=Area of the characteristic m/z for the parameter to be measured.

A_{is}=Area of the characteristic m/z for the inernal standard.

C_{is}=Concentration of the internal standard.

C_s=Concentration of the parameter to be measured.

If the RF value over the working range is a constant (<35% RSD), the RF can be assumed to be invariant and the average RF can be used for calculations. Alternatively, the results can be used to plot a calibration curve of response ratios, A_s/A_{is}, vs. RF.

7.4 The working calibration curve or RF must be verified on each working day by the measurement of a QC check sample.

7.4.1 Prepare the QC check sample as described in Section 8.2.2.

7.4.2 Analyze the QC check sample according to the method beginning in Section 10.

7.4.3 For each parameter, compare the response (Q) with the corresponding calibration acceptance criteria found in Table 5. If the responses for all parameters of interest fall within the designated ranges, analysis of actual samples can begin. If any individual Q falls outside the range, proceed according to Section 7.4.4.

NOTE: The large number of parameters in Table 5 present a substantial probability that one or more will not meet the calibration acceptance criteria when all parameters are analyzed.

7.4.4 Repeat the test only for those parameters that failed to meet the calibration acceptance criteria. If the response for a parameter does not fall within the range in this second test, a new calibration curve or RF must be prepared for that parameter according to Section 7.3.

8. Quality Control

8.1 Each laboratory that uses this method is required to operate a formal quality control program. The minimum requirements of this program consist of an initial demonstration of laboratory capability and an ongoing analysis of spiked samples to evaluate and document data quality. The laboratory must maintain records to document the quality of data that is generated. Ongoing data quality checks are compared with established performance criteria to determine if the results of analyses meet the performance characteristics of the method. When results of sample spikes indicate atypical method performance, a quality control check standard must be analyzed to confirm that the measurements were performed in an in-control mode of operation.

8.1.1 The analyst must make an initial, one-time, demonstration of the ability to generate acceptable accuracy and precision with this method. This ability is established as described in Section 8.2.

8.1.2 In recognition of advances that are occurring in chromatography, the analyst is permitted certain options (detailed in Section 11.1) to improve the separations or lower the cost of measurements. Each time such a modification is made to the method, the analyst is required to repeat the procedure in Section 8.2.

8.1.3 Each day, the analyst must analyze a reagent water blank to demonstrate that interferences from the analytical system are under control.

8.1.4 The laboratory must, on an ongoing basis, spike and analyze a minimum of 5% of all samples to monitor and evaluate laboratory data quality. This procedure is described in Section 8.3.

8.1.5 The laboratory must, on an ongoing basis, demonstrate through the analyses of quality control check standards that the operation of the measurement system is in control. This procedure is described in Section 8.4. The frequency of the check standard analyses is equivalent to 5% of all samples analyzed but may be reduced if spike recoveries from samples (Section 8.3) meet all specified quality control criteria.

8.1.6 The laboratory must spike all samples with surrogate standards to monitor continuing laboratory performance. This procedure is described in Section 8.5.

8.1.7 The laboratory must maintain performance records to document the quality of data that is generated. This procedure is described in Section 8.6.

8.2 To establish the ability to generate acceptable accuracy and precision, the analyst must perform the following operations.

8.2.1 A quality control (QC) check sample concentrate is required containing each parameter of interest at a concentration of 10 μg/mL in methanol. The QC check sample concentrate must be obtained from the U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory in Cincinnati, Ohio, if available. If not available from that source, the QC check sample concentrate must be obtained from another external source. If not available from either source above, the QC check sample concentrate must be prepared by the laboratory using stock standards prepared independently from those used for calibration.

8.2.2 Prepare a QC check sample to contain 20 μg/L of each parameter by adding 200 μL of QC check sample concentrate to 100 mL of reagent water.

8.2.3 Analyze four 5-mL aliquots of the well-mixed QC check sample according to the method beginning in Section 10.

8.2.4 Calculate the average recovery ($\bar{X}$) in μg/L, and the standard deviation of the recovery (s) in μg/L, for each parameter of interest using the four results.

8.2.5 For each parameter compare s and $\bar{X}$ with the corresponding acceptance criteria for precision and accuracy, respectively, found in Table 5. If s and $\bar{X}$ for all parameters of interest meet the acceptance criteria, the system performance is acceptable and analysis of actual samples can begin. If any individual s exceeds the precision limit or any individual $\bar{X}$ falls outside the range for accuracy, the system performance is unacceptable for that parameter.

NOTE: The large number of parameters in Table 5 present a substantial probability that one or more will fail at least one of the acceptance criteria when all parameters are analyzed.

8.2.6 When one or more of the parameters tested fail at least one of the acceptance criteria, the analyst must proceed according to Section 8.2.6.1 or 8.2.6.2.

8.2.6.1 Locate and correct the source of the problem and repeat the test for all parameters of interest beginning with Section 8.2.3.

8.2.6.2 Beginning with Section 8.2.3, repeat the test only for those parameters that failed to meet criteria. Repeated failure, however, will confirm a general problem with the measurement system. If this occurs, locate and correct the source of the problem and repeat the test for all compounds of interest beginning with Section 8.2.3.

8.3 The laboratory must, on an ongoing basis, spike at least 5% of the samples from each sample site being monitored to assess accuracy. For laboratories analyzing 1 to 20 samples per month, at least one spiked sample per month is required.

8.3.1 The concentration of the spike in the sample should be determined as follows:

8.3.1.1 If, as in compliance monitoring, the concentration of a specific parameter in the sample is being checked against a regulatory concentration limit, the spike should be at that limit or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.2 If the concentration of a specific parameter in the sample is not being checked against a limit specific to that parameter, the spike should be at 20 μg/L or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.2 Analyze one 5-mL sample aliquot to determine the background concentration

(B) of each parameter. If necessary, prepare a new QC check sample concentrate (Section 8.2.1) appropriate for the background concentrations in the sample. Spike a second 5-mL sample aliquot with 10 μL of the QC check sample concentrate and analyze it to determine the concentration after spiking (A) of each parameter. Calculate each percent recovery (P) as 100(A-B)%/T, where T is the known true value of the spike.

8.3.3 Compare the percent recovery (P) for each parameter with the corresponding QC acceptance criteria found in Table 5. These acceptance criteria wer calculated to include an allowance for error in measurement of both the background and spike concentrations, assuming a spike to background ratio of 5:1. This error will be accounted for to the extent that the analyst's spike to background ratio approaches 5:1.[7] If spiking was performed at a concentration lower than 20 μg/L, the analyst must use either the QC acceptance criteria in Table 5, or optional QC acceptance criteria calculated for the specific spike concentration. To calculate optional acceptance criteria for the recoveryof a parameter: (1) Calculate accuracy (X′) using the equation in Table 6, substituting the spike concentration (T) for C; (2) calculate overall precision (S′) using the equation in Table 6, substituting X′ for $\bar{X}$; (3) calculate the range for recovery at the spike concentration as (100 X′/T) (±2.44(100 S′/T)%.[7]

8.3.4 If any individual P falls outside the designated range for recovery, that parameter has failed the acceptance criteria. A check standard containing each parameter that failed the criteria must be analyzed as described in Section 8.4.

8.4 If any parameter fails the acceptance criteria for recovery in Section 8.3, a QC check standard containing each parameter that failed must be prepared and analyzed.

NOTE: The frequency for the required analaysis of a QC check standard will depend upon the number of parameters being simultaneously tested, the complexity of the sample matrix, and the performance of the laboratory. If the entire list of parameters in Table 5 must be measured in the sample in Section 8.3, the probability that the analysis of a QC check standard will be required is high. In this case the QC check standard should be routinely analyzed with the spiked sample.

8.4.1 Prepare the QC check standard by adding 10 μL of QC check sample concentrate (Section 8.2.1 or 8.3.2) to 5 mL of reagent water. The QC check standard needs only to contain the parameters that failed criteria in the test in Section 8.3.

8.4.2 Analyze the QC check standard to determine the concentration measured (A) of each parameter. Calculate each percent recovery (P_s) as 100 (A/T)%, where T is the true value of the standard concentration.

8.4.3 Compare the percent recovery (P_s) for each parameter with the corresponding QC acceptance criteria found in Table 5. Only parameters that failed the test in Section 8.3 need to be compared with these criteria. If the recovery of any such parameter falls outside the designated range, the laboratory performance for that parameter is judged to be out of control, and the problem must be immediately identified and corrected. The analytical result for that parameter in the unspiked sample is suspect and may not be reported for regulatory compliance purposes.

8.5 As a quality control check, the laboratory must spike all samples with the surrogate standard spiking solutions as described in Section 11.4, and calculate the percent recovery of each surrogate compound.

8.6 As part of the QC program for the laboratory, method accuracy for wastewater samples must be assessed and records must be maintained. After the analysis of five spiked wastewater samples as in Section 8.3, calculate the average percent recovery ($\bar{P}$) and the standard deviation of the percent recovery (s_p). Express the accuracy assessment as a percent recovery interval from $\bar{P}-2s_p$ to $\bar{P} + 2s_p$. If $\bar{P}=90\%$ and $s_p=10\%$, for example, the accuracy interval is expressed as 70–110%. Update the accuracy assessment for each parameter a regular basis (e.g. after each five to ten new accuracy measurements).

8.7 It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Field duplicates may be analyzed to assess the precision of the environmental measurements. Whenever possible, the laboratory should analyze standard reference materials and participate in relevant performance evaluation studies.

9. Sample Collection, Preservation, and Handling

9.1 All samples must be iced or refrigerated from the time of collection until analysis. If the sample contains residual chlorine, add sodium thiosulfate preservative (10 mg/40 mL is sufficient for up to 5 ppm Cl_2) to the empty sample bottle just prior to shipping to the sampling site. EPA Methods 330.4 and 330.5 may be used for measurement of residual chlorine.[8] Field test kits are available for this purpose.

9.2 Grab samples must be collected in glass containers having a total volume of at least 25 mL. Fill the sample bottle just to overflowing in such a manner that no air bubbles pass through the sample as the bottle is being filled. Seal the bottle so that no air bubbles are entrapped in it. If preservative has been added, shake vigorously for 1 min. Maintain the hermetic seal on the sample bottle until time of analysis.

9.3 Experimental evidence indicates that some aromatic compounds, notably benzene, toluene, and ethyl benzene are susceptible to rapid biological degradation under certain environmental conditions.[3] Refrigeration alone may not be adequate to preserve these compounds in wastewaters for more than seven days. For this reason, a separate sample should be collected, acidified, and analyzed when these aromatics are to be determined. Collect about 500 mL of sample in a clean container. Adjust the pH of the sample to about 2 by adding 1+1 HCl while stirring vigorously. Check pH with narrow range (1.4 to 2.8) pH paper. Fill a sample container as described in Section 9.2.

9.4 All samples must be analyzed within 14 days of collection.[3]

10. Daily GC/MS Performance Tests

10.1 At the beginning of each day that analyses are to be performed, the GC/MS system must be checked to see if acceptable performance criteria are achieved for BFB.[9] The performance test must be passed before any samples, blanks, or standards are analyzed, unless the instrument has met the DFTPP test described in Method 625 earlier in the day.[10]

10.2 These performance tests require the following instrumental parameters:

Electron Energy: 70 V (nominal)
Mass Range: 20 to 260 amu
Scan Time: To give at least 5 scans per peak but not to exceed 7 s per scan.

10.3 At the beginning of each day, inject 2 μL of BFB solution directly on the column. Alternatively, add 2 μL of BFB solution to 5.0 mL of reagent water or standard solution and analyze the solution according to section 11. Obtain a background-corrected mass spectrum of BFB and confirm that all the key m/z criteria in Table 2 are achieved. If all the criteria are not achieved, the analyst must retune the mass pectrometer and repeat the test until all riteria are achieved.

11. Sample Purging and Gas Chromatography

11.1 Table 1 summarizes the recommend- d operating conditions for the gas chro- atograph. Included in this table are reten- on times and MDL that can be achieved nder these conditions. An example of the parations achieved by this column is own in Figure 5. Other packed columns or romatographic conditions may be used if e requirements of Section 8.2 are met.

11.2 After achieving the key m/z abundance criteria in Section 10, calibrate the system daily as described in Section 7.

11.3 Adjust the purge gas (helium) flow rate to 40 mL/min. Attach the trap inlet to the purging device, and set the purge and trap system to purge (Figure 3). Open the syringe valve located on the purging device sample introduction needle.

11.4 Allow the sample to come to ambient temperature prior to introducing it into the syringe. Remove the plunger from a 5-mL syringe and attach a closed syringe valve. Open the sample bottle (or standard) and carefully pour the sample into the syringe barrel tc just short of overflowing. Replace the syringe plunger and compress the sample. Open the syringe valve and vent any residual air while adjusting the sample volume to 5.0 mL. Since this process of taking an aliquot destroys the validity of the sample for future analysis, the analyst should fill a second syringe at this time to protect against possible loss of data. Add 10.0 μL of the surrogate spiking solution (Section 6.7) and 10.0 μL of the internal standard spiking solution (Section 7.3.2) through the valve bore, then close the valve. The surrogate and internal standards may be mixed and added as a single spiking solution.

11.5 Attach the syringe-syringe valve assembly to the syringe valve on the purging device. Open the syringe valves and inject the sample into the purging chamber.

11.6 Close both valves and purge the sample for 11.0±0.1 min at ambient temperature.

11.7 After the 11-min purge time, attach the trap to the chromatograph, adjust the purge and trap system to the desorb mode (Figure 4), and begin to temperature program the gas chromatograph. Introduce the trapped materials to the GC column by rapidly heating the trap to 180 °C while backflushing the trap with an inert gas between 20 and 60 mL/min for 4 min. If rapid heating of the trap cannot be achieved, the GC cloumn must be used as a secondary trap by cooling it to 30 °C (subambient temperature, if problems persist) instead of the initial program temperature of 45 °C.

11.8 While the trap is being desorbed into the gas chromatograph, empty the purging chamber using the sample introduction syringe. Wash the chamber with two 5-mL flushes of reagent water.

11.9 After desorbing the sample for 4 min, recondition the trap by returning the purge and trap system to the purge mode. Wait 15 s then close the syringe valve on the purging device to begin gas flow through the trap. The trap temperature should be maintained at 180 °C. After approximately 7 min, turn off the trap heater and open the syringe valve to stop the gas flow through the trap. When the trap is cool, the next sample can be analyzed.

11.10 If the response for any m/z exceeds the working range of the system, prepare a dilution of the sample with reagent water from the aliquot in the second syringe and reanalyze.

12. Qualitative Identification

12.1 Obtain EICPs for the primary m/z (Table 4) and at least two secondary masses for each parameter of interest. The following criteria must be met to make a qualitative identification:

12.1.1 The characteristic masses of each parameter of interest must maximize in the same or within one scan of each other.

12.1.2 The retention time must fall within ±30 s of the retention time of the authentic compound.

12.1.3 The relative peak heights of the three characteristic masses in the EICPs must fall within ± 20% of the relative intensities of these masses in a reference mass spectrum. The reference mass spectrum can be obtained from a standard analyzed in the GC/MS system or from a reference library.

12.2 Structural isomers that have very similar mass spectra and less than 30 s difference in retention time, can be explicitly identified only if the resolution between authentic isomers in a standard mix is acceptable. Acceptable resolution is achieved if the baseline to valley height between the isomers is less than 25% of the sum of the two peak heights. Otherwise, structural isomers are identified as isomeric pairs.

13. Calculations

13.1 When a parameter has been identified, the quantitation of that parameter should be based on the integrated abundance from the EICP of the primary characteristic m/z given in Table 4. If the sample produces an interference for the primary m/z, use a secondary characteristic m/z to quantitate.

Calculate the concentration in the sample using the response factor (RF) determined in Section 7.3.3 and Equation 2.

$$\text{Concentration } (\mu g/L) = \frac{(A_s)(C_{is})}{(A_{is})(RF)}$$

Equation 2

where:

A_s=Area of the characteristic m/z for the parameter or surrogate standard to be measured.

A_{is}=Area of the characteristic m/z for the internal standard.

C_{is}=Concentration of the internal standard.

13.2 Report results in µg/L without correction for recovery data. All QC data obtained should be reported with the sample results.

14. Method Performance

14.1 The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero.[1] The MDL concentrations listed in Table 1 were obtained using reagent water.[11] Similar results were achieved using representative wastewaters. The MDL actually achieved in a given analysis will vary depending on instrument sensitivity and matrix effects.

14.2 This method was tested by 15 laboratories using reagent water, drinking water, surface water, and industrial wastewaters spiked at six concentrations over the range 5-600 µg/L.[13] Single operator precision, overall precision, and method accuracy were found to be directly related to the concentration of the parameter and essentially independent of the sample matrix. Linear equations to describe these relationships are presented in Table 5.

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TABLE 1.—CHROMATOGRAPHIC CONDITIONS AND METHOD DETECTION LIMITS

Parameter	Retention time (min)	Method detection limit (µg/L)
hloromethane	2.3	nd
romomethane	3.1	nd
nyl chloride	3.8	nd
hloroethane	4.6	nd
ethylene chloride	6.4	2.8
ichlorofluoromethane	8.3	nd
1-Dichloroethene	9.0	2.8
1-Dichloroethane	10.1	4.7
ans-1,2-Dichloroethene	10.8	1.6
hloroform	11.4	1.6
2-Dichloroethane	12.1	2.8
1,1-Trichloroethane	13.4	3.8
rbon tetrachloride	13.7	2.8
omodichloromethane	14.3	2.2
2-Dichloroproane	15.7	6.0
-1,3-Dichloropropene	15.9	5.0
chloroethene	16.5	1.9
nzene	17.0	4.4
romochloromethane	17.1	3.1
,2-Trichloroethane	17.2	5.0
ns-1,3-Dichloropropene	17.2	nd
Chloroethylvinyl ether	18.6	nd
omoform	19.8	4.7

TABLE 1.—CHROMATOGRAPHIC CONDITIONS AND METHOD DETECTION LIMITS—Continued

Parameter	Retention time (min)	Method detection limit (µg/L)
1,1,2,2-Tetrachloroethane	22.1	6.9
Tetrachloroethene	22.2	4.1
Toluene	23.5	6.0
Chlorobenzene	24.6	6.0
Ethyl benzene	26.4	7.2
1,3-Dichlorobenzene	33.9	nd
1,2-Dichlorobenzene	35.0	nd
1,4-Dichlorobenzene	35.4	nd

Column conditions: Carbopak B (60/80 mesh) coated with 1% SP-1000 packed in a 6 ft by 0.1 in. ID glass column with helium carrier gas at 30 mL/min. flow rate. Column temperature held at 45°C for 3 min., then programmed at 8°C/min. to 220°C and held for 15 min.

nd=not determined.

TABLE 2.—BFB KEY M/Z ABUNDANCE CRITERIA

Mass	m/z Abundance criteria
50	15 to 40% of mass 95.
75	30 to 60% of mass 95.
95	Base Peak, 100% Relative Abundance.
96	5 to 9% of mass 95.
173	<2% of mass 174.
174	>50% of mass 95.
175	5 to 9% of mass 174.
176	>95% but < 101% of mass 174.
177	5 to 9% of mass 176.

TABLE 3.—SUGGESTED SURROGATE AND INTERNAL STANDARDS

Compound	Retention time (min)[a]	Primary m/z	Secondary masses
Benzene d-6	17.0	84	
4-Bromofluorobenzene	28.3	95	174, 176
1,2-Dichloroethane d-4	12.1	102	
1,4-Difluorobenzene	19.6	114	63, 88
Ethylbenzene d-5	26.4	111	
Ethylbenzene d-10	26.4	98	
Fluorobenzene	18.4	96	70
Pentafluorobenzene	23.5	168	
Bromochloromethane	9.3	128	49, 130, 51
2-Bromo-1-chloropropane	19.2	77	79, 156
1, 4-Dichlorobutane	25.8	55	90, 92

[a]For chromatographic conditions, see Table 1.

TABLE 4.—CHARACTERISTIC MASSES FOR PURGEABLE ORGANICS

Parameter	Primary	Secondary
Chloromethane	50	52.
Bromomethane	94	96.

TABLE 4.—CHARACTERISTIC MASSES FOR PURGEABLE ORGANICS—Continued

Parameter	Primary	Secondary
Vinyl chloride	62	64.
Chloroethane	64	66.
Methylene chloride	84	49, 51, and 86.
Trichlorofluoromethane	101	103.
1,1-Dichloroethene	96	61 and 98.
1,1-Dichloroethane	63	65, 83, 85, 98, and 100.
trans-1,2-Dichloroethene	96	61 and 98.
Chloroform	83	85.
1,2-Dichloroethane	98	62, 64, and 100.
1,1,1-Trichloroethane	97	99, 117, and 119.
Carbon tetrachloride	117	119 and 121.
Bromodichloromethane	127	83, 85, and 129.
1,2-Dichloropropane	112	63, 65, and 114.
trans-1,3-Dichloropropene	75	77.
Trichloroethene	130	95, 97, and 132.
Benzene	78	

TABLE 4.—CHARACTERISTIC MASSES FOR PURGEABLE ORGANICS—Continued

Parameter	Primary	Secondary
Dibromochloromethane	127	129, 208, and 206.
1,1,2-Trichloroethane	97	83, 85, 99, 132, and 134.
cis-1,3-Dichloropropene	75	77.
2-Chloroethylvinyl ether	106	63 and 65.
Bromoform	173	171, 175, 250, 252, 254, and 256.
1,1,2,2-Tetrachloroethane	168	83, 85, 131, 133, and 166.
Tetrachloroethene	164	129, 131, and 166.
Toluene	92	91.
Chlorobenzene	112	114.
Ethyl benzene	106	91.
1,3-Dichlorobenzene	146	148 and 113.
1,2-Dichlorobenzene	146	148 and 113.
1,4-Dichlorobenzene	146	148 and 113.

TABLE 5.—CALIBRATION AND QC ACCEPTANCE CRITERIA—METHOD 624[a]

Parameter	Range for Q (μ/g/L)	Limit for s (μ/g/L)	Range for $\bar{X}$ (μ/g/L)	Range for P, P_s (%)
Benzene	12.8 – 27.2	6.9	15.2 – 26.0	37 – 151
Bromodichloromethane	13.1 – 26.9	6.4	10.1 – 28.0	35 – 155
Bromoform	14.2 – 25.8	5.4	11.4 – 31.1	45 – 169
Bromomethane	2.8 – 37.2	17.9	D – 41.2	D – 242
Carbon tetrachloride	14.6 – 25.4	5.2	17.2 – 23.5	70 – 140
Chlorobenzene	13.2 – 26.8	6.3	16.4 – 27.4	37 – 160
Chloroethane	7.6 – 32.4	11.4	8.4 – 40.4	14 – 230
2-Chloroethylvinyl ether	D – 44.8	25.9	D – 50.4	D – 305
Chloroform	13.5 – 26.5	6.1	13.7 – 24.2	51 – 138
Chloromethane	D – 40.8	19.8	D – 45.9	D – 273
Dibromochloromethane	13.5 – 26.5	6.1	13.8 – 26.6	53 – 149
1,2-Dichlorobenzene	12.6 – 27.4	7.1	11.8 – 34.7	18 – 190
1,3-Dichlorobenzene	14.6 – 25.4	5.5	17.0 – 28.8	59 – 156
1,4-Dichlorobenzene	12.6 – 27.4	7.1	11.8 – 34.7	18 – 190
1,1-Dichloroethane	14.5 – 25.5	5.1	14.2 – 28.5	59 – 155
1,2-Dichloroethane	13.6 – 26.4	6.0	14.3 – 27.4	49 – 155
1,1-Dichlorothene	10.1 – 29.9	9.1	3.7 – 42.3	D – 234
trans-1,2-Dichloroethene	13.9 – 26.1	5.7	13.6 – 28.5	54 – 156
1,2-Dichloropropane	6.8 – 33.2	13.8	3.8 – 36.2	D – 210
cis-1,3-Dichloropropene	4.8 – 35.2	15.8	1.0 – 39.0	D – 227
trans-1,3-Dichloropropene	10.0 – 30.0	10.4	7.6 – 32.4	17 – 183
Ethyl benzene	11.8 – 28.2	7.5	17.4 – 26.7	37 – 162
Methylene chloride	12.1 – 27.9	7.4	D – 41.0	D – 221
1,1,2,2-Tetrachloroethane	12.1 – 27.9	7.4	13.5 – 27.2	46 – 157
Tetrachloroethene	14.7 – 25.3	5.0	17.0 – 26.6	64 – 148
Toluene	14.9 – 25.1	4.8	16.6 – 26.7	47 – 150
1,1,1-Trichloroethane	15.0 – 25.0	4.6	13.7 – 30.1	52 – 162
1,1,2-Trichloroethane	14.2 – 25.8	5.5	14.3 – 27.1	52 – 150
Trichloroethene	13.3 – 26.7	6.6	18.6 – 27.6	71 – 157
Trichlorofluoromethane	9.6 – 30.4	10.0	8.9 – 31.5	17 – 181
Vinyl chloride	0.8 – 39.2	20.0	D – 43.5	D – 251

Q = Concentration measured in QC check sample, in μg/L (Section 7.5.3).
s = Standard deviation of four recovery measurements, in μg/L (Section 8.2.4).
$\bar{X}$ = Average recovery of four recovery measurements, in μg/L (Section 8.2.4).
P, P_s = Percent recovery measured, (Section 8.3.2, Section 8.4.2).
D = Detected; result must be greater than zero.
[a] Criteria were calculated assuming a QC check sample concentration of 20 μg/L.

NOTE: These criteria are based directly upon the method performance data in Table 6. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table 6.

TABLE 6.—METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION—METHOD 624

Parameter	Accuracy, as recovery, X' (μg/L)	Single analyst precision, s_r' (μg/L)	Overall precision, S' (μg/L)
Benzene	$0.93C+2.00$	$0.26\bar{X}-1.74$	$0.25\bar{X}-1.33$
Bromodichloromethane	$1.03C-1.58$	$0.15\bar{X}+0.59$	$0.20\bar{X}+1.13$
Bromoform	$1.18C-2.35$	$0.12\bar{X}+0.36$	$0.17\bar{X}+1.38$
Bromomethane [a]	$1.00C$	$0.43\bar{X}$	$0.58\bar{X}$
Carbon tetrachloride	$1.10C-1.68$	$0.12\bar{X}+0.25$	$0.11\bar{X}+0.37$
Chlorobenzene	$0.98C+2.28$	$0.16\bar{X}-0.09$	$0.26\bar{X}-1.92$
Chloroethane	$1.18C+0.81$	$0.14\bar{X}+2.78$	$0.29\bar{X}+1.75$
2-Chloroethylvinyl ether [a]	$1.00C$	$0.62\bar{X}$	$0.84\bar{X}$
Chloroform	$0.93C+0.33$	$0.16\bar{X}+0.22$	$0.18\bar{X}+0.16$
Chloromethane	$1.03C+0.81$	$0.37\bar{X}+2.14$	$0.58\bar{X}+C\ -3$
Dibromochloromethane	$1.01C-0.03$	$0.17\bar{X}-0.18$	$0.17\bar{X}+0.49$
1,2-Dichlorobenzene [b]	$0.94C+4.47$	$0.22\bar{X}-1.45$	$0.30\bar{X}-1.20$
1,3-Dichlorobenzene	$1.06C+1.68$	$0.14\bar{X}-0.48$	$0.18\bar{X}-0.82$
1,4-Dichlorobenzene [b]	$0.94C+4.47$	$0.22\bar{X}-1.45$	$0.30\bar{X}-1.20$
1,1-Dichloroethane	$1.05C+0.36$	$0.13\bar{X}-0.05$	$0.16\bar{X}+0.47$
1,2-Dichloroethane	$1.02C+0.45$	$0.17\bar{X}-0.32$	$0.21\bar{X}-0.38$
1,1-Dichloroethene	$1.12C+0.61$	$0.17\bar{X}+1.06$	$0.43\bar{X}-0.22$
trans-1,2,-Dichloroethene	$1.05C+0.03$	$0.14\bar{X}+0.09$	$0.19\bar{X}+0.17$
1,2-Dichloropropane [a]	$1.00C$	$0.33\bar{X}$	$0.45\bar{X}$
cis-1,3-Dichloropropene [a]	$1.00C$	$0.38\bar{X}$	$0.52\bar{X}$
trans-1,3-Dichloropropene [a]	$1.00C$	$0.25\bar{X}$	$0.34\bar{X}$
Ethyl benzene	$0.98C+2.48$	$0.14\bar{X}+1.00$	$0.26\bar{X}-1.72$
Methylene chloride	$0.87C+1.88$	$0.15\bar{X}+1.07$	$0.32\bar{X}+4.00$
1,1,2,2-Tetrachloroethane	$0.93C+1.76$	$0.16\bar{X}+0.69$	$0.20\bar{X}+0.41$
Tetrachloroethene	$1.06C+0.60$	$0.13\bar{X}-0.18$	$0.16\bar{X}-0.45$
Toluene	$0.98C+2.03$	$0.15\bar{X}-0.71$	$0.22\bar{X}-1.71$
1,1,1-Trichloroethane	$1.06C+0.73$	$0.12\bar{X}-0.15$	$0.21\bar{X}-0.39$
1,1,2-Trichloroethane	$0.95C+1.71$	$0.14\bar{X}+0.02$	$0.18\bar{X}+0.00$
Trichloroethene	$1.04C+2.27$	$0.13\bar{X}+0.36$	$0.12\bar{X}+0.59$
Trichloroflouromethane	$0.99C+0.39$	$0.33\bar{X}-1.48$	$0.34\bar{X}-0.39$
Vinyl chloride	$1.00C$	$0.48\bar{X}$	$0.65\bar{X}$

X'=Expected recovery for one or more measurements of a sample containing a concentration of C, in μg/L.

s_r'=Expected single analyst standard deviation of measurements at an average concentration found of $\bar{X}$, in μg/L.

S'=Expected interlaboratory standard deviation of measurements at an average concentrs'on found of $\bar{X}$, in μg/L.

C=True value for the concentration, in μg/L.

$\bar{X}$=Average recovery found for measurements of samples containing a concentration of C, in μg/L.

[a] Estimates based upon the performance in a single laboratory.[13]

[b] Due to chromatographic resolution problems, performance statements for these isomers are based upon the sums of their concentrations.

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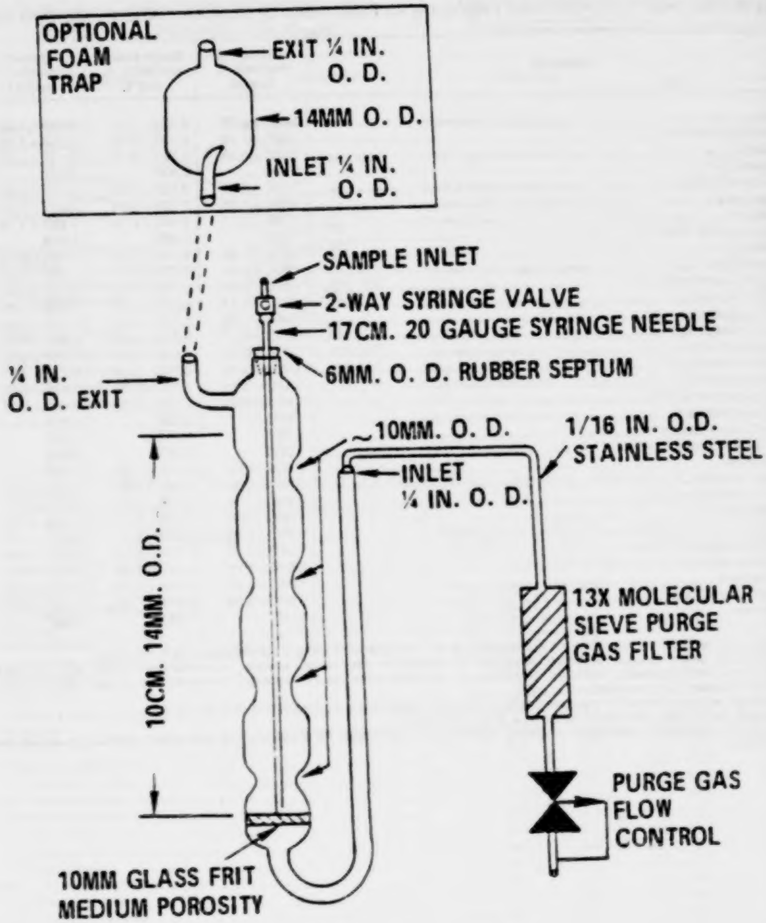
OPTIONAL FOAM TRAP
EXIT ¼ IN. O. D.
14MM O. D.
INLET ¼ IN. O. D.
SAMPLE INLET
2-WAY SYRINGE VALVE
17CM. 20 GAUGE SYRINGE NEEDLE
6MM. O. D. RUBBER SEPTUM
¼ IN. O. D. EXIT
~10MM. O. D.
1/16 IN. O.D. STAINLESS STEEL
INLET ¼ IN. O. D.
10CM. 14MM. O.D.
13X MOLECULAR SIEVE PURGE GAS FILTER
PURGE GAS FLOW CONTROL
10MM GLASS FRIT MEDIUM POROSITY

Figure 1. Purging device.

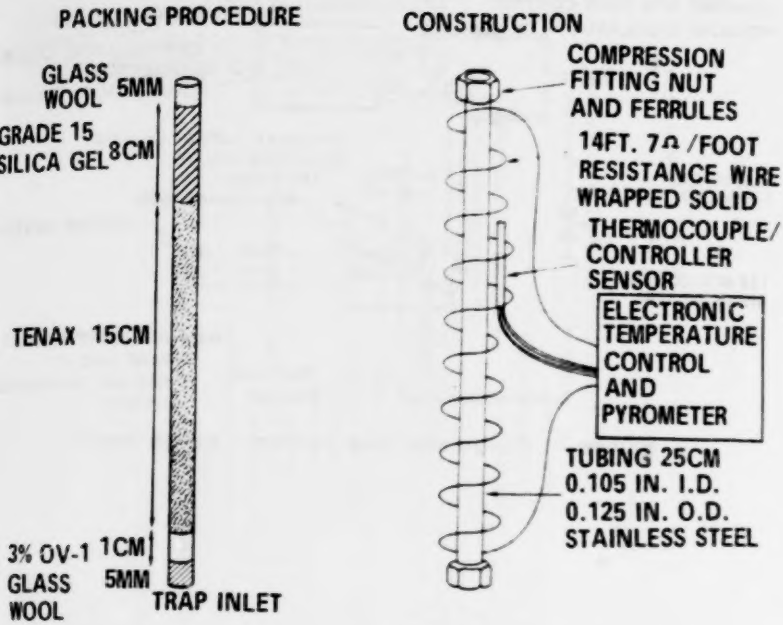
PACKING PROCEDURE
GLASS WOOL 5MM
GRADE 15 SILICA GEL 8CM
TENAX 15CM
3% OV-1 1CM
GLASS WOOL 5MM
TRAP INLET
CONSTRUCTION
COMPRESSION FITTING NUT AND FERRULES
14FT. 7Ω /FOOT RESISTANCE WIRE WRAPPED SOLID
THERMOCOUPLE/ CONTROLLER SENSOR
ELECTRONIC TEMPERATURE CONTROL AND PYROMETER
TUBING 25CM 0.105 IN. I.D. 0.125 IN. O.D. STAINLESS STEEL

Figure 2. Trap packings and construction to include desorb capability.

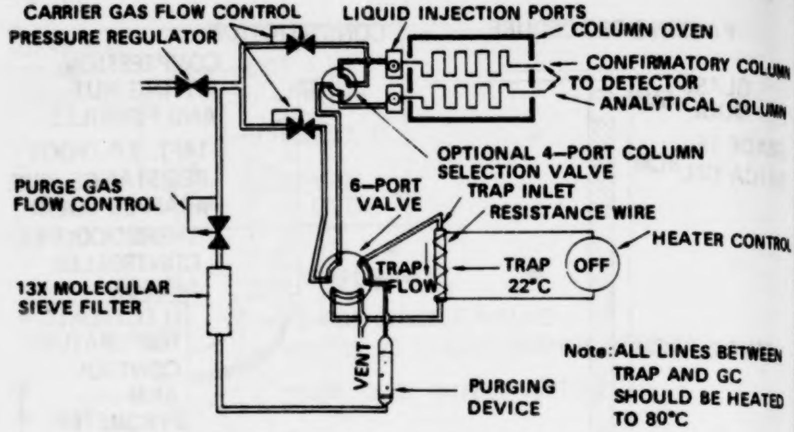
CARRIER GAS FLOW CONTROL
PRESSURE REGULATOR
LIQUID INJECTION PORTS
COLUMN OVEN
CONFIRMATORY COLUMN
TO DETECTOR
ANALYTICAL COLUMN
OPTIONAL 4-PORT COLUMN SELECTION VALVE
PURGE GAS FLOW CONTROL
6-PORT VALVE
TRAP INLET
RESISTANCE WIRE
HEATER CONTROL
TRAP
FLOW
TRAP 22°C
OFF
13X MOLECULAR SIEVE FILTER
VENT
PURGING DEVICE
Note: ALL LINES BETWEEN TRAP AND GC SHOULD BE HEATED TO 80°C

Figure 3. Purge and trap system - purge mode.

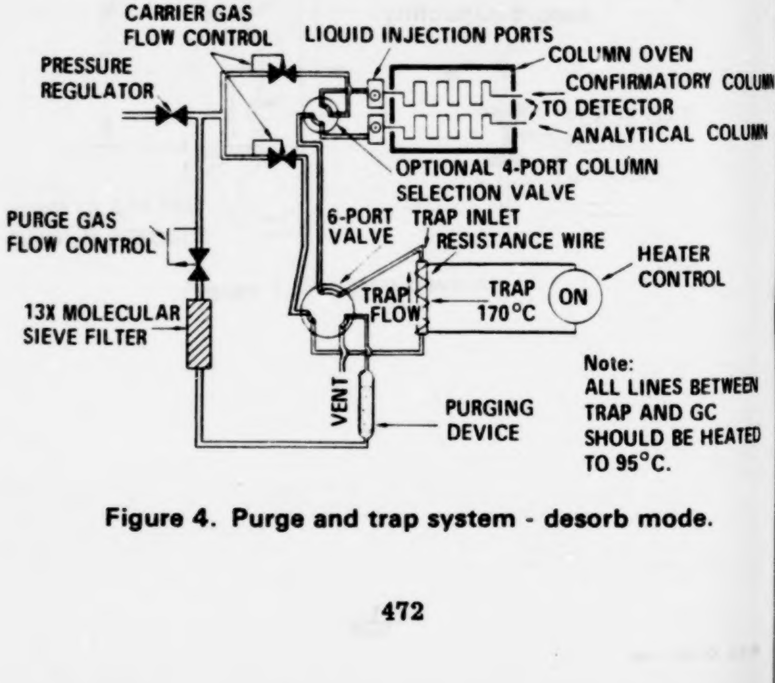
CARRIER GAS FLOW CONTROL
PRESSURE REGULATOR
LIQUID INJECTION PORTS
COLUMN OVEN
CONFIRMATORY COLUMN
TO DETECTOR
ANALYTICAL COLUMN
OPTIONAL 4-PORT COLUMN SELECTION VALVE
PURGE GAS FLOW CONTROL
6-PORT VALVE
TRAP INLET
RESISTANCE WIRE
HEATER CONTROL
TRAP
FLOW
TRAP 170°C
ON
13X MOLECULAR SIEVE FILTER
VENT
PURGING DEVICE
Note: ALL LINES BETWEEN TRAP AND GC SHOULD BE HEATED TO 95°C.

Figure 4. Purge and trap system - desorb mode.

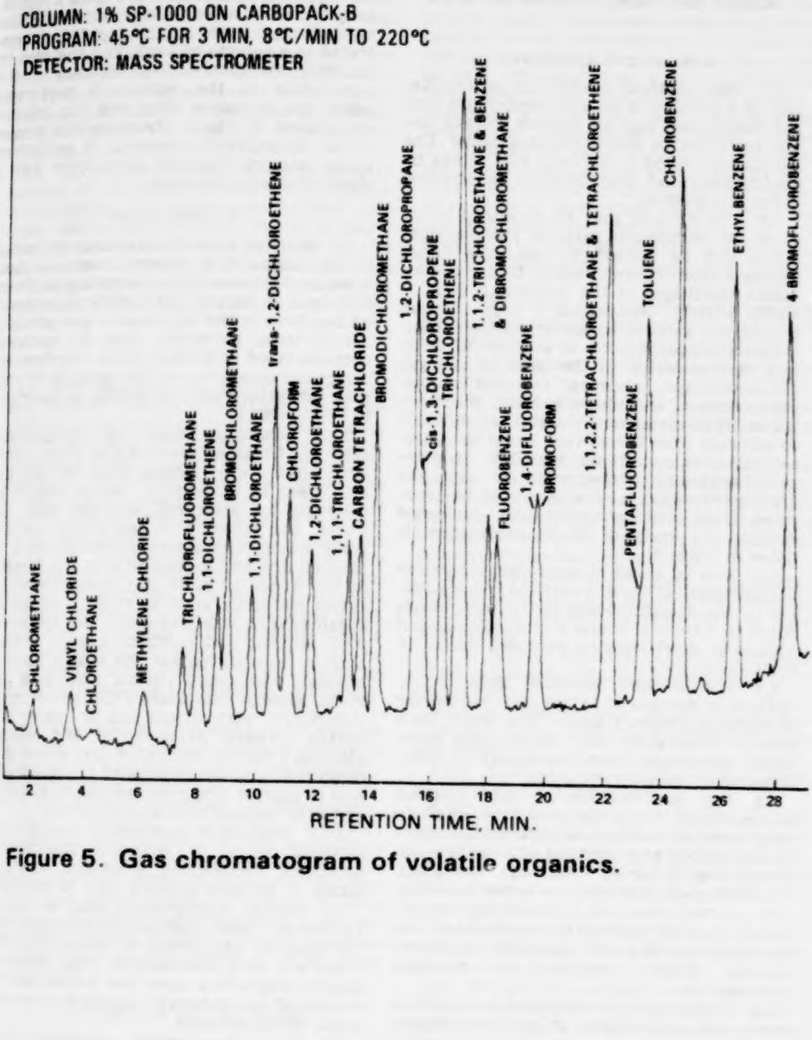

Figure 5. Gas chromatogram of volatile organics.

METHOD 625—BASE/NEUTRALS AND ACIDS

1. Scope and Application

1.1 This method covers the determination of a number of organic compounds that are partitioned into an organic solvent and are amenable to gas chromatography. The parameters listed in Tables 1 and 2 may be qualitatively and quantitatively determined using this method.

1.2 The method may be extended to include the parameters listed in Table 3. Benzidine can be subject to oxidative losses during solvent concentration. Under the alkaline conditions of the extraction step, α-BHC, γ-BHC, endosulfan I and II, and endrin are subject to decomposition. Hexachlorocyclopentadiene is subject to thermal decomposition in the inlet of the gas chromatograph, chemical reaction in acetone solution, and photochemical decomposition. N-nitrosodimethylamine is difficult to separate from the solvent under the chromatographic conditions described. N-nitrosodiphenylamine decomposes in the gas chromatographic inlet and cannot be separated from diphenylamine. The preferred method for each of these parameters is listed in Table 3.

1.3 This is a gas chromatographic/mass spectrometry (GC/MS) method[2, 14] applicable to the determination of the compounds listed in Tables 1, 2, and 3 in municipal and industrial discharges as provided under 40 CFR 136.1.

1.4 The method detection limit (MDL, defined in Section 16.1)[1] for each parameter is listed in Tables 4 and 5. The MDL for a specific wastewater may differ from those listed, depending upon the nature of interferences in the sample matrix.

1.5 Any modification to this method, beyond those expressly permitted, shall be considered as a major modification subject to application and approval of alternate test procedures under 40 CFR 136.4 and 136.5. Depending upon the nature of the modification and the extent of intended use, the applicant may be required to demonstrate that the modifications will produce equivalent results when applied to relevant wastewaters.

1.6 This method is restricted to use by or under the supervision of analysts experienced in the use of a gas chromatograph/mass spectrometer and in the interpretation of mass spectra. Each analyst must demonstrate the ability to generate acceptable results with this method using the procedure described in Section 8.2.

2. Summary of Method

2.1 A measured volume of sample, approximately 1-L, is serially extracted with methylene chloride at a pH greater than 11 and again at a pH less than 2 using a separatory funnel or a continuous extractor.[8] The methylene chloride extract is dried, concentrated to a volume of 1 mL, and analyzed by GC/MS. Qualitative identification of the parameters in the extract is performed using the retention time and the relative abundance of three characteristic masses (m/z). Quantitative analysis is performed using internal standard techniques with a single characteristic m/z.

3. Interferences

3.1 Method interferences may be caused by contaminants in solvents, reagents, glassware, and other sample processing hardware that lead to discrete artifacts and/or elevated baselines in the total ion current profiles. All of these materials must be routinely demonstrated to be free from interferences under the conditions of the analysis by running laboratory reagent blanks as described in Section 8.1.3.

3.1.1 Glassware must be scrupulously cleaned.[9] Clean all glassware as soon as possible after use by rinsing with the last solvent used in it. Solvent rinsing should be followed by detergent washing with hot water, and rinses with tap water and distilled water. The glassware should then be drained dry, and heated in a muffle furnace at 400 °C for 15 to 30 min. Some thermally stable materials, such as PCBs, may not be eliminated by this treatment. Solvent rinses with acetone and pesticide quality hexane may be substituted for the muffle furnace heating. Thmrough rinsing with such solvents usually eliminates PCB interference. Volumetric ware should not be heated in a muffle furnace. After drying and cooling, glassware should be sealed and stored in a clean environment to prevent any accumulation of dust or other contaminants. Store inverted or capped with aluminum foil.

3.1.2 The use of high purity reagents and solvents helps to minimize interference problems. Purification of solvents by distillation in all-glass systems may be required.

3.2 Matrix interferences may be caused by contaminants that are co-extracted from the sample. The extent of matrix interferences will vary considerably from source to source, depending upon the nature and diversity of the industrial complex or municipality being sampled.

3.3 The base-neutral extraction may cause significantly reduced recovery of phenol, 2-methylphenol, and 2,4-dimethylphenol. The analyst must recognize that results obtained under these conditions are minimum concentrations.

3.4 The packed gas chromatographic columns recommended for the basic fraction may not exhibit sufficient resolution for certain isomeric pairs including the following: anthracene and phenanthrene; chrysene and benzo(a)anthracene; and benzo(b)fluoranthene and benzo(k)fluoranthene. The gas chromatographic retention time and mass spectra for these pairs of compounds are not sufficiently different to make an unambiguous identification. Alternative techniques should be used to identify and quantify these specific compounds, such as Method 610.

3.5 In samples that contain an inordinate number of interferences, the use of chemi- cal ionization (CI) mass spectrometry may make identification easier. Tables 6 and 7 give characteristic CI ions for most of the compounds covered by this method. The use of CI mass spectrometry to support electron onization (EI) mass spectrometry is encour- ged but not required.

4. Safety

4.1 The toxicity or carcinogenicity of ach reagent used in this method have not een precisely defined; however, each chem- cal compound should be treated as a poten- ial health hazard. From this viewpoint, exosure to these chemicals must be reduced o the lowest possible level by whatever neans available. The laboratory is responsi- le for maintaining a current awareness file f OSHA regulations regarding the safe andling of the chemicals specified in this ethod. A reference file of material data andling sheets should also be made avail- ble to all personnel involved in the chemi- al analysis. Additional references to labora- ory safety are available and have been lentified[2-4] for the information of the ana- st.

4.2 The following parameters covered by is method have been tentatively classified known or suspected, human or mammali- carcinogens: benzo(a)anthracene, benzi- ne, 3,3′-dichlorobenzidine, benzo(a)pyrene, BHC, β-BHC, δ-BHC, γ-BHC, benzo(a,h)anthracene, N-nitrosodimethy- mine, 4,4′-DDT, and polychlorinated bi- enyls (PCBs). Primary standards of these xic compounds should be prepared in a od. A NIOSH/MESA approved toxic gas spirator should be worn when the analyst andles high concentrations of these toxic mpounds.

5. Apparatus and Materials

.1 Sampling equipment, for discrete or mposit sampling.

.1.1 Grab sample bottle—1-L or 1-gt, ber glass, fitted with a screw cap lined h Teflon. Foil may be substituted for flon if the sample is not corrosive. If ber bottles are not available, protect sam- s from light. The bottle and cap liner st be washed, rinsed with acetone or thylene chloride, and dried before use to nimize contamination.

5.1.2 Automatic sampler (optional)—The sampler must incorporate glass sample containers for the collection of a minimum of 250 mL of sample. Sample containers must be kept refrigerated at 4 °C and protected from light during compositing. If the sampler uses a peristaltic pump, a minimum length of compressible silicone rubber tubing may be used. before use, however, the compressible tubing should be throughly rinsed with methanol, followed by repeated rinsings with distilled water to minimize the potential for contamination of the sample. An integrating flow meter is required to collect flow proportional composites.

5.2 Glassware (All specifications are suggested. Catalog numbers are included for illustration only.):

5.2.1 Separatory funnel—2-L, with Teflon stopcock.

5.2.2 Drying column—Chromatographic column, 19 mm ID, with coarse frit filter disc.

5.2.3 Concentrator tube, Kuderna-Danish—10-mL, graduated (Kontes K-570050-1025 or equivalent). Calibration must be checked at the volumes employed in the test. Ground glass stopper is used to prevent evaporation of extracts.

5.2.4 Evaporative flask, Kuderna-Danish—500-mL (Kontes K-57001-0500 or equivalent). Attach to concentrator tube with springs.

5.2.5 Snyder column, Kuderna-Danish—Three all macro (Kontes K-503000-0121 or equivalent).

5.2.6 Snyder column, Kuderna-Danish—Two-ball macro (Kontes K-569001-0219 or equivalent).

5.2.7 Vials—10 to 15-mL, amber glass, with Teflon-lined screw cap.

5.2.8 Continuous liquid—liquid extractor—Equipped with Teflon or glass connecting joints and stopcocks requiring no lubrication. (Hershberg-Wolf Extractor, Ace Glass Company, Vineland, N.J., P/N 6841-10 or equivalent.)

5.3 Boiling chips—Approximately 10/40 mesh. Heat to 400 °C for 30 min of Soxhlet extract with methylene chloride.

5.4 Water bath—Heated, with concentric ring cover, capable of temperature control (±2°C). The bath should be used in a hood.

5.5 Balance—Analytical, capable of accurately weighing 0.0001 g.

5.6 GC/MS system:

5.6.1 Gas Chromatograph—An analytical system complete with a temperature programmable gas chromatograph and all required accessores including syringes, analytical columns, and gases. The injection port must be designed for on-column injection when using packed columns and for splitless injection when using capillary columns.

5.6.2 Column for base/neutrals—1.8 m long x 2 mm ID glass, packed with 3% SP-2250 on Supelcoport (100/120 mesh) or equivalent. This column was used to develop the method performance statements in Section 16. Guidelines for the use of alternate column packings are provided in Section 13.1.

5.6.3 Column for acids—1.8 m long x 2 mm ID glass, packed with 1% SP-1240DA on Supelcoport (100/120 mesh) or equivalent. This column was used to develop the method performance statements in Section 16. Guidelines for the use of alternate column packings are given in Section 13.1.

5.6.4 Mass spectrometer—Capable of scanning from 35 to 450 amu every 7 s or less, utilizing a 70 V (nominal) electron energy in the electron impact ionization mode, and producing a mass spectrum which meets all the criteria in Table 9 when 50 ng of decafluorotriphenyl phosphine (DFTPP; bis(perfluorophenyl) phenyl phosphine) is injected through the GC inlet.

5.6.5 GC/MS interface—Any GC to MS interface that gives acceptable calibration points at 50 ng per injection for each of the parameters of interest and achieves all acceptable performance criteria (Section 12) may be used. GC to MS interfaces constructed of all glass or glass-lined materials are recommended. Glass can be deactivated by silanizing with dichlorodimethylsilane.

5.6.6 Data system—A computer system must be interfaced to the mass spectrometer that allows the contiluous acquisition and storage on machine-readable media of all mass spectra obtained throughout the duration of the chromatographic program. The computer must have software that allows searching any GC/MS data file for specific m/z and plotting such m/z abundances versus time or scan number. This type of plot is defined as an Extracted Ion Current Profile (EICP). Software must also be available that allows integrating the abundance in any EICP between specified time or scan number limits.

6. Reagents

6.1 Reagent water—Reagent water is defined as a water in which an interferent is not observed at the MDL of the parameters of interest.

6.2 Sodium hydroxide solution (10 N)—Dissolve 40 g of NaOH (ACS) in reagent water and dilute to 100 mL.

6.3 Sodium thiosulfate—(ACS) Granular.

6.4 Sulfuric acid (1+1)—Slowly, add 50 mL of H_2SO_4 (ACS, sp. gr. 1.84) to 50 mL of reagent water.

6.5 Acetone, methanol, methlylene chloride—Pesticide quality or equivalent.

6.6 Sodium sulfate—(ACS) Granular, anhydrous. Purify by heating at 400 °C for 4 h in a shallow tray.

6.7 Stock standard solutions (1.00 μg/μL)—standard solutions can be prepared from pure standard materials or purchased as certified solutions.

6.7.1 Prepare stock standard solutions by accurately weighing about 0.0100 g of pure material. Dissolve the material in pesticide quality acetone or other suitable solvent and dilute to volume in a 10-mL volumetric flask. Larger volumes can be used at the convenience of the analyst. When compound purity is assayed to be 96% or greater, the weight may be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards may be used at any concentration if they are certified by the manufacturer or by an independent source.

6.7.2 Transfer the stock standard solutions into Teflon-sealed screw-cap bottles. Store at 4 °C and protect from light. Stock standard solutions should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

6.7.3 Stock standard solutions must be replaced after six months, or sooner if comparison with quality control check samples indicate a problem.

6.8 Surrogate standard spiking solution—Select a minimum of three surrogate compounds from Table 8. Prepare a surrogate standard spiking solution containing each selected surrogate compound at a concentration of 100 μg/mL in acetone. Addition of 1.00 mL of this solution to 1000 mL of sample is equivalent to a concentration of 100 μg/L of each surrogate standard. Store the spiking solution at 4 °C in Teflon-sealed glass container. The solution should be checked frequently for stability. The solution must be replaced after six months, or sooner if comparison with quality control check standards indicates a problem.

6.9 DFTPP standard—Prepare a 25 μg/mL solution of DFTPP in acetone.

6.10 Quality control check sample concentrate—See Section 8.2.1.

7. Calibration

7.1 Establish gas chromatographic operating parameters equivalent to those indicated in Table 4 or 5.

7.2 Internal standard calibration procedure—To use this approach, the analyst must select three or more internal standards that are similar in analytical behavior to the compounds of interest. The analyst must further demonstrate that the measurement of the internal standards is not affected by method or matrix interferences. Some recommended internal standards are listed in Table 8. Use the base peak m/z as the primary m/z for quantification of the standards. If interferences are noted, use one of the next two most intense m/z quantities for quantification.

7.2.1 Prepare calibration standards at a minimum of three concentration levels for each parameter of interest by adding appropriate volumes of one or more stock standards to a volumetric flask. To each calibration standard or standard mixture, add a known constant amount of one or more internal standards, and and dilute to volume with acetone. One of the calibration standards should be at a concentration near, but above, the MDL and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the GC/MS system.

7.2.2 Using injections of 2 to 5 μL, analyze each calibration standard according to Section 13 and tabulate the area of the primary characteristic m/z (Tables 4 and 5) against concentration for each compound and internal standard. Calculate response factors (RF) for each compound using Equation 1.

$$RF = \frac{(A_s)(C_{is})}{(A_{is})(C_s)}$$

Equation 1

where:

A_s=Area of the characteristic m/z for the parameter to be measured.

A_{is}=Area of the characteristic m/z for the internal standard.

C_{is}=Concentration of the internal standard (μg/L).

C_s=Concentration of the parameter to be measured (μg/L).

If the RF value over the working range is a constant (<35% RSD), the RF can be assumed to be invariant and the average RF can be used for calculations. Alternatively, the results can be used to plot a calibration curve of response ratios, A_s/A_{is}, vs. RF.

7.3 The working calibration curve or RF must be verified on each working day by the measurement of one or more calibration standards. If the response for any parameter varies from the predicted response by more than ±20%, the test must be repeated using a fresh calibration standard. Alternatively, a new calibration curve must be prepared for that compound.

8. Quality Control

8.1 Each laboratory that uses this method is required to operate a formal quality control program. The minimum requirements of this program consist of an initial demonstration of laboratory capability and an ongoing analysis of spiked samples to evaluate and document data quality. The laboratory must maintain records to document the quality of data that is generated. Ongoing data quality checks are compared with established performance criteria to determine if the results of analyses meet the performance characteristics of the method. When results of sample spikes indicate atypical method performance, a quality control check standard must be analyzed to confirm that the measurements were performed in an in-control mode of operation.

8.1.1 The analyst must make an initial, one-time, demonstration of the ability to generate acceptable accuracy and precision with this method. This ability is established as described in Section 8.2.

8.1.2 In recognition of advances that are occuring in chromatography, the analyst is permitted certain options (detailed in Sections 10.6 and 13.1) to improve the separations or lower the cost of measurements. Each time such a modification is made to the method, the analyst is required to repeat the procedure in Section 8.2.

8.1.3 Before processing any samples, the analyst must analyze a reagent water blank to demonstrate that interferences from the analytical system and glassware are under control. Each time a set of samples is extracted or reagents are changed, a reagent water blank must be processed as a safeguard against laboratory contamination.

8.1.4 The laboratory must, on an ongoing basis, spike and analyze a minimum of 5% of all samples to monitor and evaluate laboratory data quality. This procedure is described in Section 8.3.

8.1.5 The laboratory must, on an ongoing basis, demonstrate through the analyses of quality control check standards that the operation of the measurement system is in control. This procedure is described in Section 8.4. The frequency of the check standard analyses is equivalent to 5% of all samples analyzed but may be reduced if spike recoveries from samples (Section 8.3) meet all specified quality control criteria.

8.1.6 The laboratory must maintain performance records to document the quality of data that is generated. This procedure is described in Section 8.5.

8.2 To establish the ability to generate acceptable accuracy and precision, the analyst must perform the following operations.

8.2.1 A quality control (QC) check sample concentrate is required containing each parameter of interest at a concentration of 100 μg/mL in acetone. Multiple solutions may be required. PCBs and multicomponent pesticides may be omitted from this test. The QC check sample concentrate must be obtained from the U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory in Cincinnati, Ohio, if available. If not available from that source, the QC check sample concentrate must be obtained from another external source. If not available from either source above, the QC check sample concentrate must be prepared by the laboratory using stock standards prepared independently from those used for calibration.

8.2.2 Using a pipet, prepare QC check samples at a concentration of 100 μg/L by adding 1.00 mL of QC check sample concentrate to each of four 1-L aliquots of reagent water.

8.2.3 Analyze the well-mixed QC check samples according to the method beginning in Section 10 or 11.

8.2.4 Calculate the average recovery (X) in μg/L, and the standard deviation of the recovery (s) in μg/L, for each parameter using the four results.

8.2.5 For each parameter compare s and X with the corresponding acceptance criteria for precision and accuracy, respectively, found in Table 6. If s and X for all parameters of interest meet the acceptance criteria, the system performance is acceptable and analysis of actual samples can begin. If any individual s exceeds the precision limit or any individual X falls outside the range for accuracy, the system performance is unacceptable for that parameter.

NOTE: The large number of parameters in Table 6 present a substantial probability that one or more will fail at least one of the acceptance criteria when all parameters are analyzed.

8.2.6 When one or more of the parameters tested fail at least one of the acceptance criteria, the analyst must proceed according to Section 8.2.6.1 or 8.2.6.2.

8.2.6.1 Locate and correct the source of the problem and repeat the test for all parameters of interest beginning with Section 8.2.2.

8.2.6.2 Beginning with Section 8.2.2, repeat the test only for those parameters that failed to meet criteria. Repeated failure, however, will confirm a general problem with the measurement system. If this occurs, locate and correct the source of the problem and repeat the test for all compounds of interest beginning with Section 8.2.2.

8.3 The laboratory must, on an ongoing basis, spike at least 5% of the samples from each sample site being monitored to assess accuracy. For laboratories analyzing 1 to 20 samples per month, at least one spiked sample per month is required.

8.3.1. The concentration of the spike in the sample should be determined as follows:

8.3.1 If, as in compliance monitoring, the concentration of a specific parameter in the sample is being checked against a regulatory concentration limit, the spike should be at that limit or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.2 If the concentration of a specific parameter in the sample is not being checked against a limit specific to that parameter, the spike should be at 100 μg/L or 1 to 5 times higher than the background concentration determined in Section 8.3.2, whichever concentration would be larger.

8.3.1.3 If it is impractical to determine background levels before spiking (e.g., maximum holding times will be exceeded), the spike concentration should be (1) the regulatory concentration limit, if any; or, if none (2) the larger of either 5 times higher than the expected background concentration or 100 μg/L.

8.3.2 Analyze one sample aliquot to determine the background concentration (B) of each parameter. If necessary, prepare a new QC check sample concentrate (Section 8.2.1) appropriate for the background concentrations in the sample. Spike a second sample aliquot with 1.0 mL of the QC check sample concentrate and analyze it to determine the concentration after spiking (A) of each parameter. Calculate each percent recovery (P) as 100(A-B)%/T, where T is the known true value of the spike.

8.3.3 Compare the percent recovery (P) for each parameter with the corresponding QC acceptance criteria found in Table 6. These acceptance criteria were calculated to include an allowance for error in measurement of both the background and spike concentrations, assuming a spike to background ratio of 5:1. This error will be accounted for to the extent that the analyst's spike to background ratio approaches 5:1.[7] If spiking was performed at a concentration lower than 100 μg/L, the analyst must use either the QC acceptance criteria in Table 6, or optional QC acceptance criteria calculated for the specific spike concentration. To calculate optional acceptance criteria for the recovery of a parameter: (1) Calculate accuracy (X′) using the equation in Table 7, substituting the spike concentration (T) for C; (2) calculate overall precision (S′) using the equation in Table 7, substituting X′ for X̄; (3) calculate the range for recovery at the spike concentration as (100 X′/T)±2.44(100 S′/T)%[7]

8.3.4 If any individual P falls outside the designated range for recovery, that parameter has failed the acceptance criteria. A check standard containing each parameter that failed the criteria must be analyzed as described in Section 8.4.

8.4 If any parameter fails the acceptance criteria for recovery in Section 8.3, a QC check standard containing each parameter that failed must be prepared and analyzed.

NOTE: The frequency for the required analysis of a QC check standard will depend

on the number of parameters being si-
ultaneously tested, the complexity of the
mple matrix, and the performance of the
oratory. If the entire list of single-com-
nent parameters in Table 6 must be meas-
ed in the sample in Section 8.3, the proba-
ity that the analysis of a QC check stand-
d will be required is high. In this case the
C check standard should be routinely ana-
ed with the spike sample.

.4.1 Prepare the QC check standard by
ding 1.0 mL of QC check sample concen-
te (Section 8.2.1 or 8.3.2) to 1 L of rea-
t water. The QC check standard needs
y to contain the parameters that failed
eria in the test in Section 8.3.

.4.2 Analyze the QC check standard to
ermine the concentration measured (A)
each parameter. Calculate each percent
overy (P_s) as 100 (A/T)%, where T is the
e value of the standard concentration.

.4.3 Compare the percent recovery (P_s)
each parameter with the corresponding
acceptance criteria found in Table 6.
y parameters that failed the test in Sec-
8.3 need to be compared with these cri-
a. If the recovery of any such parameter
s outside the designated range, the labo-
ry performance for that parameter is
ged to be out of control, and the problem
t be immediately identified and correct-
The analytical result for that parameter
he unspiked sample is suspect and may
be reported for regulatory compliance
poces.

5 As part of the QC program for the
ratory, method accuracy for wastewater
ples must be assessed and records must
maintained. After the analysis of five
ed wastewater samples as in Section 8.3,
ulate the average percent recovery ($\bar{P}$)
the standard deviation of the percent
very (s_p). Express the accuracy assess-
t as a percent interval from $\bar{P}-2s_p$ to
s_p. If $\bar{P}$=90% and s_p=10%, for example,
accuracy interval is expressed as
110%. Update the accuracy assessment
each parameter on a regular basis (e.g.
each five to ten new accuracy meas-
nents).

As a quality control check, the labo-
y must spike all samples with the sur-
te standard spiking solution as de-
ed in Section 10.2, and calculate the
ent recovery of each surrogate com-
d.

It is recommended that the laborato-
dopt additional quality assurance prac-
for use with this method. The specific
ices that are most productive depend
the needs of the laboratory and the
re of the samples. Field duplicates may
nalyzed to assess the precision of the
onmental measurements. Whenever
ble, the laboratory should analyze
lard reference materials and partici-
pate in relevant performance evaluation studies.

9. Sample Collection, Preservation, and Handling

9.1 Grab samples must be collected in glass containers. Conventional sampling practices[8] should be followed, except that the bottle must not be prerinsed with sample before collection. Composite samples should be collected in refrigerated glass containers in accordance with the requirements of the program. Automatic sampling equipment must be as free as possible of Tygon tubing and other potential sources of contamination.

9.2 All sampling must be iced or refrigerated at 4 °C from the time of collection until extraction. Fill the sample bottles and, if residual chlorine is present, add 80 mg of sodium thiosulfate per liter of sample and mix well. EPA Methods 330.4 and 330.5 may be used for measurement of residual chlorine.[9] Field test kits are available for this purpose.

9.3 All samples must be extracted within 7 days of collection and completely analyzed within 40 days of extraction.

10. Separatory Funnel Extraction

10.1 Samples are usually extracted using separatory funnel techniques. If emulsions will prevent achieving acceptable solvent recovery with separatory funnel extractions, continuous extraction (Section 11) may be used. The separatory funnel extraction scheme described below assumes a sample volume of 1 L. When sample volumes of 2 L are to be extracted, use 250, 100, and 100-mL volumes of methylene chloride for the serial extraction of the base/neutrals and 200, 100, and 100-mL volumes of methylene chloride for the acids.

10.2 Mark the water meniscus on the side of the sample bottle for later determination of sample volume. Pour the entire sample into a 2-L separatory funnel. Pipet 1.00 mL of the surrogate standard spiking solution into the separatory funnel and mix well. Check the pH of the sample with wide-range pH paper and adjust to pH>11 with sodium hydroxide solution.

10.3 Add 60 mL of methylene chloride to the sample bottle, seal, and shake for 30 s to rinse the inner surface. Transfer the solvent to the separatory funnel and extract the sample by shaking the funnel for 2 min. with periodic venting to release excess pressure. Allow the organic layer to separate from the water phase for a minimum of 10 min. If the emulsion interface between layers is more than one-third the volume of the solvent layer, the analyst must employ mechanical techniques to complete the phase separation. The optimum technique depends upon the sample, but may include stirring, filtration of the emulsion through glass wool, centrifugation, or other physical methods. Collect the methylene chloride extract in a 250-mL Erlenmeyer flask. If the emulsion cannot be broken (recovery of less than 80% of the methylene chloride, corrected for the water solubility of methylene chloride), transfer the sample, solvent, and emulsion into the extraction chamber of a continuous extractor and proceed as described in Section 11.3.

10.4 Add a second 60-mL volume of methylene chloride to the sample bottle and repeat the extraction procedure a second time, combining the extracts in the Erlenmeyer flask. Perform a third extraction in the same manner. Label the combined extract as the base/neutral fraction.

10.5 Adjust the pH of the aqueous phase to less than 2 using sulfuric acid. Serially extract the acidified aqueous phase three times with 60-mL aliquots of methylene chloride. Collect and combine the extracts in a 250-mL Erlenmeyer flask and label the combined extracts as the acid fraction.

10.6 For each fraction, assemble a Kuderna-Danish (K-D) concentrator by attaching a 10-mL concentrator tube to a 500-mL evaporative flask. Other concentration devices or techniques may be used in place of the K-D concentrator if the requirements of Section 8.2 are met.

10.7 For each fraction, pour the combined extract through a solvent-rinsed drying column containing about 10 cm of anhydrous sodium sulfate, and collect the extract in the K-D concentrator. Rinse the Erlenmeyer flask and column with 20 to 30 mL of methylene chloride to complete the quantitative transfer.

10.8 Add one or two clean boiling chips and attach a three-ball Snyder column to the evaporative flask for each fraction. Prewet each Snyder column by adding about 1 mL of methylene chloride to the top. Place the K-D apparatus on a hot water bath (60 to 65 °C) so that the concentrator tube is partially immersed in the hot water, and the entire lower rounded surface of the flask is bathed with hot vapor. Adjust the vertical position of the apparatus and the water temperature as required to complete the concentration in 15 to 20 min. At the proper rate of distillation the balls of the column will actively chatter but the chambers will not flood with condensed solvent. When the apparent volume of liquid reaches 1 mL, remove the K-D apparatus from the water bath and allow it to drain and cool for at least 10 min. Remove the Snyder column and rinse the flask and its lower joint into the concentrator tube with 1 to 2 mL of methylene chloride. A 5-mL syringe is recommended for this operation.

10.9 Add another one or two clean boiling chips to the concentrator tube for each fraction and attach a two-ball micro-Snyd column. Prewet the Snyder column adding about 0.5 mL of methylene chlori to the top. Place the K-D apparatus on hot water bath (60 to 65 °C) so that the co centrator tube is partially immersed in h water. Adjust the vertical position of the paratus and the water temperature as quired to complete the concentration in 10 min. At the proper rate of distillation balls of the column will actively chatter the chambers will not flood with conden solvent. When the apparent volume liquid reaches about 0.5 mL, remove the D apparatus from the water bath and al it to drain and cool for at least 10 m Remove the Snyder column and rinse flask and its lower joint into the concent tor tube with approximately 0.2 mL of tone or methylene chloride. Adjust the fi volume to 1.0 mL with the solvent. Stopp the concentrator tube and store refrigera if further processing will not be perform immediately. If the extracts will be sto longer than two days, they should be tra ferred to Teflon-sealed screw-cap vials labeled base/neutral or acid fraction as propriate.

10.10 Determine the original sa volume by refilling the sample bottle to mark and transferring the liquid to a 1 mL graduated cylinder. Record the sa volume to the nearest 5 mL.

11. Continuous Extraction

11.1 When experience with a sa from a given source indicates that a seri emulsion problem will result or an emuls is encountered using a separatory funnel Section 10.3, a continuous extractor sho be used.

11.2 Mark the water meniscus on the of the sample bottle for later determina of sample volume. Check the pH of sample with wide-range pH paper adjust to pH >11 with sodium hydroxide lution. Transfer the sample to the conti ous extractor and using a pipet, add 1.00 of surrogate standard spiking solution mix well. Add 60 mL of methylene chlor to the sample bottle, seal, and shake for to rinse the inner surface. Transfer the vent to the extractor.

11.3 Repeat the sample bottle rinse an additional 50 to 100-mL portion of m ylene chloride and add the rinse to the tractor.

11.4 Add 200 to 500 mL of methyl chloride to the distilling flask, add cient reagent water to ensure proper ation, and extract for 24 h. Allow to then detach the distilling flask. Dry, centrate, and seal the extract as in Sect 10.6 through 10.9.

11.5 Charge a clean distilling flask 500 mL of methylene chloride and atta the continuous extractor. Carefully, ile stirring, adjust the pH of the aqueous ase to less than 2 using sulfuric acid. Ex- ct for 24 h. Dry, concentrate, and seal extract as in Sections 10.6 through 10.9.

12. Daily GC/MS Performance Tests

2.1 At the beginning of each day that lyses are to be performed, the GC/MS tem must be checked to see if acceptable formance criteria are achieved for TPP.[10] Each day that benzidine is to be ermined, the tailing factor criterion de- bed in Section 12.4 must be achieved. h day that the acids are to be deter- ed, the tailing factor criterion in Section 5 must be achieved.

2.2 These performance tests require the owing instrumental parameters:

lectron Energy: 70 V (nominal)
lass Range: 35 to 450 amu
can Time: To give at least 5 scans per peak but not to exceed 7 s per scan.

2.3 DFTPP performance test—At the inning of each day, inject 2 μL (50 ng) of TPP standard solution. Obtain a back- und-corrected mass spectra of DFTPP confirm that all the key m/z criteria in le 9 are achieved. If all the criteria are achieved, the analyst must retune the s spectrometer and repeat the test until criteria are achieved. The performance eria must be achieved before any sam- , blanks, or standards are analyzed. The ilg factor tests in Sections 12.4 and 12.5 be performed simultaneously with the TPP test.

2.4 Column performance test for base/ trals—At the beginning of each day that base/neutral fraction is to be analyzed benzidine, the benzidine tailing factor t be calculated. Inject 100 ng of benzi- e either separately or as a part of a ndard mixture that may contain DFTPP calculate the tailing factor. The benzi- e tailing factor must be less than 3.0. culation of the tailing factor is illustrat- n Figure 13.[11] Replace the column pack- if the tailing factor criterion cannot be ieved.

2.5 Column performance test for acids— he beginning of each day that the acids to be determined, inject 50 ng of pen- lorophenol either separately or as a t of a standard mix that may contain TPP. The tailing factor for pentachloro- nol must be less than 5. Calculation of tailing factor is illustrated in Figure [1] Replace the column packing if the tail- factor criterion cannot be achieved.

13. Gas Chromatography/Mass Spectrometry

.1 Table 4 summarizes the recommend- gas chromatographic operating condi- s for the base/neutral fraction. Table 5 summarizes the recommended gas chromatographic operating conditions for the acid fraction. Included in these tables are retention times and MDL that can be achieved under these conditions. Examples of the separations achieved by these columns are shown in Figures 1 through 12. Other packed or capillary (open-tubular) columns or chromatographic conditions may be used if the requirements of Section 8.2 are met.

13.2 After conducting the GC/MS performance tests in Section 12, calibrate the system daily as described in Section 7.

13.3 The internal standard must be added to sample extract and mixed thoroughly immediately before it is injected into the instrument. This procedure minimizes losses due to adsorption, chemical reaction or evaporation.

13.4 Inject 2 to 5 μL of the sample extract or standard into the GC/MS system using the solvent-flush technique.[11] Smaller (1.0 μL) volumes may be injected if automatic devices are employed. Record the volume injected to the nearest 0.05 μL.

13.5 If the response for any m/z exceeds the working range of the GC/MS system, dilute the extract and reanalyze.

13.6 Perform all qualitative and quantitative measurements as described in Sections 14 and 15. When the extracts are not being used for analyses, store them refrigerated at 4°C, protected from light in screw-cap vials equipped with unpierced Teflon-lined septa.

14. Qualitative Identification

14.1 Obtain EICPs for the primary m/z and the two other masses listed in Tables 4 and 5. See Section 7.3 for masses to be used with internal and surrogate standards. The following criteria must be met to make a qualitative identification:

14.1.1 The characteristic masses of each parameter of interest must maximize in the same or within one scan of each other.

14.1.2 The retention time must fall within ±30 s of the retention time of the authentic compound.

14.1.3 The relative peak heights of the three characteristic masses in the EICPs must fall within ±20% of the relative intensities of these masses in a reference mass spectrum. The reference mass spectrum can be obtained from a standard analyzed in the GC/MS system or from a reference library.

14.2 Structural isomers that have very similar mass spectra and less than 30 s difference in retention time, can be explicitly identified only if the resolution between authentic isomers in a standard mix is acceptable. Acceptable resolution is achieved if the baseline to valley height between the isomers is less than 25% of the sum of the two peak heights. Otherwise, structural isomers are identified as isomeric pairs.

15. Calculations

15.1 When a parameter has been identified, the quantitation of that parameter will be based on the integrated abundance from the EICP of the primary characteristic m/z in Tables 4 and 5. Use the base peak m/z for internal and surrogate standards. If the sample produces an interference for the mary m/z, use a secondary characteristi z to quantitate.

Calculate the concentration in the sam using the response factor (RF) determi in Section 7.2.2 and Equation 3.

$$\text{Concentration } (\mu g/L) = \frac{(A_s)(I_s)}{(A_{is})(RF)(V_o)}$$

Equation 3

where:

A_s=Area of the characteristic m/z for the parameter or surrogate standard to be measured.

A_{is}=Area of the characteristic m/z for the internal standard.

I_s=Amount of internal standard added to each extract (μg).

V_o=Volume of water extracted (L).

15.2 Report results in μg/L without correction for recovery data. All QC data obtained should be reported with the sample results.

16. Method Performance

16.1 The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero.[1] The MDL concentrations listed in Tables 4 and 5 were obtained using reagent water.[13] The MDL actually achieved in a given analysis will vary depending on instrument sensitivity and matrix effects.

16.2 This method was tested by 15 laboratories using reagent water, drinking water, surface water, and industrial wastewaters spiked at six concentrations over the range 5 to 1300 μg/L.[14] Single operator precision, overall precision, and method accuracy were found to be directly related to the concentration of the parameter and essentially independent of the sample matrix. Linear equations to describe these relationships are presented in Table 7.

17. Screening Procedure for 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)

17.1 If the sample must be screened for the presence of 2,3,7,8-TCDD, it is recommended that the reference material not be handled in the laboratory unless extensive safety precautions are employed. It is sufficient to analyze the base/neutral extract by selected ion monitoring (SIM) GC/MS techniques, as follows:

17.1.1 Concentrate the base/neutral extract to a final volume of 0.2 ml.

17.1.2 Adjust the temperature of t base/neutral column (Section 5.6.2) to °C.

17.1.3 Operate the mass spectrometer acquire data in the SIM mode using the i at m/z 257, 320 and 322 and a dwell time greater than 333 milliseconds per mass.

17.1.4 Inject 5 to 7 μL of the base/ne tral extract. Collect SIM data for a total 10 min.

17.1.5 The possible presence of 2,3,7 TCDD is indicated if all three masses exhi it simultaneous peaks at any point in the lected ion current profiles.

17.1.6 For each occurrence where t possible presence of 2,3,7,8-TCDD is indic ed, calculate and retain the relative ab dances of each of the three masses.

17.2 False positives to this test may caused by the presence of single or coel ing combinations of compounds whose ma spectra contain all of these masses.

17.3 Conclusive results of the prese and concentration level of 2,3,7,8-TCDD c be obtained only from a properly equipp laboratory through the use of EPA Meth 613 or other approved alternate test pro dures.

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TABLE 1.—BASE/NEUTRAL EXTRACTABLES

Parameter	STORET No.	CAS No.
Acenaphthene	34205	83-32-9
Acenaphthylene	34200	208-96-8
Anthracene	34220	120-12-7
Aldrin	39330	309-00-2
Benzo(a)anthracene	34526	56-55-3
Benzo(b)fluoranthene	34230	205-99-2
Benzo(k)fluoranthene	34242	207-08-9
Benzo(a)pyrene	34247	50-32-8
Benzo(ghi)perylene	34521	191-24-2
Benzyl butyl phthalate	34292	85-68-7
β-BHC	39338	319-85-7
δ-BHC	34259	319-86-8
Bis(2-chloroethyl) ether	34273	111-44-4
Bis(2-chloroethoxy)methane	34278	111-91-1
Bis(2-ethylhexyl) phthalate	39100	117-81-7
Bis(2-chloroisopropyl) ether*	34283	108-60-1

TABLE 1.—BASE/NEUTRAL EXTRACTABLES—Continued

Parameter	STORET No.	CAS No.
4-Bromophenyl phenyl ether*	34636	101-55-3
Chlordane	39350	57-74-9
2-Chloronaphthalele	34581	91-58-7
4-Chlorophenyl phenyl ether	34641	7005-72-3
Chrysene	34320	218-01-9
4,4′-DDD	39310	72-54-8
4,4′-DDE	39320	72-55-9
4,4′-DDT	39300	50-29-3
Dibenzo(a,h)anthracene	34556	53-70-3
Di-n-butylphthalate	39110	84-74-2
1,3-Dichlorobenzene	34566	541-73-1
1,2-Dichlorobenzene	34536	95-50-1
1,4-Dichlorobenzene	34571	106-46-7
3,3′-Dichlorobenzidine	34631	91-94-1
Dieldrin	39380	60-57-1
Diethyl phthalate	34336	84-66-2
Dimethyl phthalate	34341	131-11-3
2,4-Dinitrotoluene	34611	121-14-2
2,6-Dinitrotoluene	34626	606-20-2
Di-n-octylphthalate	34596	117-84-0
Endosulfan sulfate	34351	1031-07-8
Endrin aldehyde	34366	7421-93-4
Fluoranthene	34376	206-44-0
Fluorene	34381	86-73-7
Heptachlor	39410	76-44-8
Heptchlor epoxide	39420	1024-57-3
Hexachlorobenzene	39700	118-74-1
Hexachlorobutadiene	34391	87-68-3
Hexachloroethane	34396	67-72-1
Indeno(1,2,3-cd)pyrene	34403	193-39-5
Isophorone	34408	78-59-1
Naphthalene	34696	91-20-3
Nitrobenzene	34447	98-95-3
N-Nitrosodi-n-propylamine	34428	621-64-7
PCB-1016	34671	12674-11-2
PCB-1221	39488	11104-28-2
PCB-1232	39492	11141-16-5
PCB-1242	39496	53469-21-9
PCB-1248	39500	12672-29-6
PCB-1254	39504	11097-69-1
PCB-1260	39508	11096-82-5
Phenanthrene	34461	85-01-8
Pyrene	34469	129-00-0
Toxaphene	39400	8001-35-2
1,2,4-Trichlorobenzene	34551	120-82-1

*The proper chemical name is 2,2′-oxybis(1-chloropropane).

TABLE 2.—ACID EXTRACTABLES

Parameter	STORET No.	CAS No.
4-Chloro-3-methylphenol	34452	59-50-7
2-Chlorophenol	34586	95-57-8
2,4-Dichlorophenol	34601	120-83-2
2,4-Dimethylphenol	34606	105-67-9
2,4-Dinitrophenol	34616	51-28-5
2-Methyl-4,6-dinitrophenol	34657	534-52-1
2-Nitrophenol	34591	88-75-5
4-Nitrophenol	34646	100-02-7
Pentachlorophenol	39032	87-86-5
Phenol	34694	108-95-2
2,4,6-Trichlorophenol	34621	88-06-2

TABLE 3.—ADDITIONAL EXTRACTABLE PARAMETERS [a]

Parameter	STORET No.	CAS No.	Method
Benzidine	39120	92-87-5	605
β-BHC	39337	319-84-6	608
δ-BHC	39340	58-89-8	608
Endosulfan I	34361	959-98-8	608
Endosulfan II	34356	33213-65-9	608

TABLE 3.—ADDITIONAL EXTRACTABLE PARAMETERS [a]—Continued

Parameter	STORET No.	CAS No.
Endrin	39390	72-20-8
Hexachlorocylopentadiene	34386	77-47-4
N-Nitrosodimethylamine	34438	62-75-9
N-Nitrosodiphenylamine	34433	86-30-6

[a] See Section 1.2.

TABLE 4.—CHROMATOGRAPHIC CONDITIONS, METHOD DETECTION LIMITS, AND CHARACTERISTIC MASSES FOR BASE/NEUTRAL EXTRACTABLES

Parameter	Retention time (min)	Method detection limit (µg/L)	Characteristic masses				
			Electron impact			Chemical ionization	
			Primary	Secondary	Secondary	Methane	Methane
1,3-Dichlorobenzene	7.4	1.9	146	148	113	146	148
1,4-Dichlorobenzene	7.8	4.4	146	148	113	146	148
Hexachloroethane	8.4	1.6	117	201	199	199	201
Bis(2-chloroethyl) ether [a]	8.4	5.7	93	63	95	63	107
1,2-Dichlorobenzene	8.4	1.9	146	148	113	146	148
Bis(2-chloroisopropyl) ether [a]	9.3	5.7	45	77	79	77	135
N-Nitrosodi-n-propylamine			130	42	101		
Nitrobenzene	11.1	1.9	77	123	65	124	152
Hexachlorobutadiene	11.4	0.9	225	223	227	223	225
1,2,4-Trichlorobenzene	11.6	1.9	180	182	145	181	183
Isophorone	11.9	2.2	82	95	138	139	167
Naphthalene	12.1	1.6	128	129	127	129	157
Bis(2-chloroethoxy) methane	12.2	5.3	93	95	123	65	107
Hexachlorocyclopentadiene [a]	13.9		237	235	272	235	237
2-Chloronaphthalene	15.9	1.9	162	164	127	163	191
Acenaphthylene	17.4	3.5	152	151	153	152	153
Acenaphthene	17.8	1.9	154	153	152	154	155
Dimethyl phthalate	18.3	1.6	163	194	164	151	163
2,6-Dinitrotoluene	18.7	1.9	165	89	121	183	211
Fluorene	19.5	1.9	166	165	167	166	167
4-Chlorophenyl phenyl ether	19.5	4.2	204	206	141		
2,4-Dinitrotoluene	19.8	5.7	165	63	182	183	211
Diethyl phthalate	20.1	1.9	149	177	150	177	223
N-Nitrosodiphenylamine [b]	20.5	1.9	169	168	167	169	170
Hexachlorobenzene	21.0	1.9	284	142	249	284	286
β-BHC [b]	21.1		183	181	109		
4-Bromophenyl phenyl ether	21.2	1.9	248	250	141	249	251
δ-BHC [b]	22.4		183	181	109		
Phenanthrene	22.8	5.4	178	179	176	178	179
Anthracene	22.8	1.9	178	179	176	178	179
β-BHC	23.4	4.2	181	183	109		
Heptachlor	23.4	1.9	100	272	274		
δ-BHC	23.7	3.1	183	109	181		
Aldrin	24.0	1.9	66	263	220		
Dibutyl phthalate	24.7	2.5	149	150	104	149	205
Heptachlor epoxide	25.6	2.2	353	355	351		
Endosulfan I [b]	26.4		237	339	341		
Fluoranthene	26.5	2.2	202	101	100	203	231
Dieldrin	27.2	2.5	79	263	279		
4,4′-DDE	27.2	5.6	246	248	176		
Pyrene	27.3	1.9	202	101	100	203	231
Endrin [b]	27.9		81	263	82		
Endosulfan II [b]	28.6		237	339	341		
4,4′-DDD	28.6	2.8	235	237	165		
Benzidine [b]	28.8	44	184	92	185	185	213
4,4′-DDT	29.3	4.7	235	237	165		
Endosulfan sulfate	29.8	5.6	272	387	422		
Endrin aldehyde			67	345	250		
Butyl benzyl phthalate	29.9	2.5	149	91	206	149	299
Bis(2-ethylhexyl) phthalate	30.6	2.5	149	167	279	149	

TABLE 4.—CHROMATOGRAPHIC CONDITIONS, METHOD DETECTION LIMITS, AND CHARACTERISTIC MASSES FOR BASE/NEUTRAL EXTRACTABLES—Continued

Parameter	Retention time (min)	Method detection limit (µg/L)	Characteristic masses					
			Electron impact			Chemical ionization		
			Primary	Secondary	Secondary	Methane	Methane	Methane
Chrysene	31.5	2.5	228	226	229	228	229	257
Benzo(a)anthracene	31.5	7.8	228	229	226	228	229	257
3,3'-Dichlorobenzidine	32.2	16.5	252	254	126			
Di-n-octyl phthalate	32.5	2.5	149					
Benzo(b)fluoranthene	34.9	4.8	252	253	125	252	253	281
Benzo(k)fluoranthene	34.9	2.5	252	253	125	252	253	281
Benzo(a)pyrene	36.4	2.5	252	253	125	252	253	281
Indeno(1,2,3-cd) pyrene	42.7	3.7	276	138	277	276	277	305
Dibenzo(a,h)anthracene	43.2	2.5	278	139	279	278	279	307
Benzo(ghi)perylene	45.1	4.1	276	138	277	276	277	305
N-Nitrosodimethylamine [b]			42	74	44			
Chlordane [c]	19–30		373	375	377			
Toxaphene [c]	25–34		159	231	233			
PCB 1016 [c]	18–30		224	260	294			
PCB 1221 [c]	15–30	30	190	224	260			
PCB 1232 [c]	15–32		190	224	260			
PCB 1242 [c]	15–32		224	260	294			
PCB 1248 [c]	12–34		294	330	262			
PCB 1254 [c]	22–34	36	294	330	362			
PCB 1260 [c]	23–32		330	362	394			

[a] The proper chemical name is 2,2'-bisoxy(1-chloropropane).

[b] See Section 1.2.

[c] These compounds are mixtures of various isomers (See Figures 2 through 12). Column conditions: Supelcoport (100/120 mesh) coated with 3% SP–2250 packed in a 1.8 m long x 2 mm ID glass column with helium carrier gas at 30 mL/min. flow rate. Column temperature held isothermal at 50 °C for 4 min., then programmed at 8 °C/min. to 270 °C and held for 30 min.

TABLE 5.—CHROMATOGRAPHIC CONDITIONS, METHOD DETECTION LIMITS, AND CHARACTERISTIC MASSES FOR ACID EXTRACTABLES

Parameter	Retention time (min)	Method detection limit (µg/L)	Characteristic masses					
			Electron impact			Chemical ionization		
			Primary	Secondary	Secondary	Methane	Methane	Methane
2-Chlorophenol	5.9	3.3	128	64	130	129	131	157
2-Nitrophenol	6.5	3.6	139	65	109	140	168	122
Phenol	8.0	1.5	94	65	66	95	123	135
2,4-Dimethylphenol	9.4	2.7	122	107	121	123	151	163
2,4-Dichlorophenol	9.8	2.7	162	164	98	163	165	167
2,4,6-Trichlorophenol	11.8	2.7	196	198	200	197	199	201
-Chloro-3-methylphenol	13.2	3.0	142	107	144	143	171	183
2,4-Dinitrophenol	15.9	42	184	63	154	185	213	225
2-Methyl-4,6-dinitrophenol	16.2	24	198	182	77	199	227	239
entachlorophenol	17.5	3.6	266	264	268	267	265	269
-Nitrophenol	20.3	2.4	65	139	109	140	168	122

Column conditions: Supelcoport (100/120 mesh) coated with 1% SP-1240DA packed in a 1.8 m long x 2mm ID glass olumn with helium carrier gas at 30 mL/min. flow rate. Column temperature held isothermal at 70 °C for 2 min. then rogrammed at 8 °C/min. to 200 °C.

TABLE 6.—QC ACCEPTANCE CRITERIA—METHOD 625

Parameter	Test conclusion (µg/L)	Limits for s (µg/L)	Range for X(µg/L)	Range for P, P, (Percent)
cenaphthene	100	27.6	60.1–132.3	47–145
cenaphthylene	100	40.2	53.5–126.0	33–145
drin	100	39.0	7.2–152.2	D–166
nthracene	100	32.0	43.4–118.0	27–133
nzo(a)anthracene	100	27.6	41.8–133.0	33–143

TABLE 6.—QC ACCEPTANCE CRITERIA—METHOD 625—Continued

Parameter	Test conclusion (μg/L)	Limits for s (μg/L)	Range for X(μg/L)	Range for P, P_s (Percent)
Benzo(b)fluoranthene	100	38.8	42.0–140.4	24-15
Benzo(k)fluoranthene	100	32.3	25.2–145.7	11-16
Benzo(a)pyrene	100	39.0	31.7–148.0	17-16
Benzo(ghi)perylene	100	58.9	D–195.0	D-21
Benzyl butyl phthalate	100	23.4	D–139.9	D-15
β-BHC	100	31.5	41.5–130.6	24-14
δ-BHC	100	21.6	D–100.0	D-11
Bis(2-chloroethyl) ether	100	55.0	42.9–126.0	12-15
Bis(2-chloroethoxy)methane	100	34.5	49.2–164.7	33-18
Bis(2-chloroisopropyl) ether*	100	46.3	62.8–138.6	36-16
Bis(2-ethylhexyl) phthalate	100	41.1	28.9–136.8	8-15
4-Bromophenyl phenyl ether	100	23.0	64.9–114.4	53-12
2-Chloronaphthalene	100	13.0	64.5–113.5	60-11
4-Chlorophenyl phenyl ether	100	33.4	38.4–144.7	25-15
Chrysene	100	48.3	44.1–139.9	17-16
4,4'-DDD	100	31.0	D–134.5	D-14
4,4'-DDE	100	32.0	19.2–119.7	4-13
4,4'-DDT	100	61.6	D–170.6	D-20
Dibenzo(a,h)anthracene	100	70.0	D–199.7	D-22
Di-n-butyl phthalate	100	16.7	8.4–111.0	1-11
1,2-Dichlorobenzene	100	30.9	48.6–112.0	32-12
1,3-Dichlorobenzene	100	41.7	16.7–153.9	D-17
1,4,-Dichlorobenzene	100	32.1	37.3–105.7	20-12
3,3'-Dhlorobenzidine	100	71.4	8.2–212.5	D-26
Dieldrin	100	30.7	44.3–119.3	29-13
Diethyl phthalate	100	26.5	D–100.0	D-11
Dimethyl phthalate	100	23.2	D–100.0	D-11
2,4-Dinitrotoluene	100	21.8	47.5–126.9	39-13
2,6-Dinitrotoluene	100	29.6	68.1–136.7	50-15
Di-n-octyl phthalate	100	31.4	18.6–131.8	4-14
Endosulfan sulfate	100	16.7	D–103.5	D-10
Endrin aldehyde	100	32.5	D–188.8	D-20
Fluoranthene	100	32.8	42.9–121.3	26-13
Fluorene	100	20.7	71.6–108.4	59-12
Heptachlor	100	37.2	D–172.2	D-19
Heptachlor epoxide	100	54.7	70.9–109.4	26-15
Hexachlorobenzene	100	24.9	7.8–141.5	D-15
Hexachlorobutadiene	100	26.3	37.8–102.2	24-11
Hexachloroethane	100	24.5	55.2–100.0	40-11
Indeno(1,2,3-cd)pyrene	100	44.6	D–150.9	D-17
Isophorone	100	63.3	46.6–180.2	21-19
Naphthalene	100	30.1	35.6–119.6	21-13
Nitrobenzene	100	39.3	54.3–157.6	35-18
N-Nitrosodi-n-propylamine	100	55.4	13.6–197.9	D-23
PCB-1260	100	54.2	19.3–121.0	D-16
Phenanthrene	100	20.6	65.2–108.7	54-12
Pyrene	100	25.2	69.6–100.0	52-11
1,2,4-Trichlorobenzene	100	28.1	57.3–129.2	44-14
4-Chloro-3-methylphenol	100	37.2	40.8–127.9	22-14
2-Chlorophenol	100	28.7	36.2–120.4	23-13
2,4-Dichlorophenol	100	26.4	52.5–121.7	39-13
2,4-Dimethylphenol	100	26.1	41.8–109.0	32-11
2,4-Dinitrophenol	100	49.8	D–172.9	D-19
2-Methyl-4,6-dinitrophenol	100	93.2	53.0–100.0	D-18
2-Nitrophenol	100	35.2	45.0–166.7	29-18
4-Nitrophenol	100	47.2	13.0–106.5	D-13
Pentachlorophenol	100	48.9	38.1–151.8	14-17
Phenol	100	22.6	16.6–100.0	5-11
2,4,6-Trichlorophenol	100	31.7	52.4–129.2	37-14

s=Standard deviation for four recovery measurements, in μg/L (Section 8.2.4).

$\bar{X}$=Average recovery for four recovery measurements, in μg/L (Section 8.2.4).

P, P_s=Percent recovery measured (Section 8.3.2, Section 8.4.2).

D=Detected; result must be greater than zero.

NOTE: These criteria are based directly upon the method performance data in Table 7. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table

* The proper chemical name is 2,2'oxybis(1-chloropropane).

TABLE 7. METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION—METHOD 625

Parameter	Accuracy, as recovery, X' (μg/L)	Single analyst precision, s_r' (μg/L)	Overall precision, S' (μg/L)
Acenaphthene	0.96C+0.19	$0.15\bar{X}-0.12$	$0.21\bar{X}-0.67$
Acenaphthylene	0.89C+0.74	$0.24\bar{X}-1.06$	$0.26\bar{X}-0.54$
Aldrin	0.78C+1.66	$0.27\bar{X}-1.28$	$0.43\bar{X}+1.13$
Anthracene	0.80C+0.68	$0.21\bar{X}-0.32$	$0.27\bar{X}-0.64$
Benzo(a)anthracene	0.88C−0.60	$0.15\bar{X}+0.93$	$0.26\bar{X}-0.28$
Benzo(b)fluoranthene	0.93C−1.80	$0.22\bar{X}+0.43$	$0.29\bar{X}+0.96$
Benzo(k)fluoranthene	0.87C−1.56	$0.19\bar{X}+1.03$	$0.35\bar{X}+0.40$
Benzo(a)pyrene	0.90C−0.13	$0.22\bar{X}+0.48$	$0.32\bar{X}+1.35$
Benzo(ghi)perylene	0.98C−0.86	$0.29\bar{X}+2.40$	$0.51\bar{X}-0.44$
Benzyl butyl phthalate	0.66C−1.68	$0.18\bar{X}+0.94$	$0.53\bar{X}+0.92$
β-BHC	0.87C−0.94	$0.20\bar{X}-0.58$	$0.30\bar{X}-1.94$
δ-BHC	0.29C−1.09	$0.34\bar{X}+0.86$	$0.93\bar{X}-0.17$
Bis(2-chloroethyl) ether	0.86C−1.54	$0.35\bar{X}-0.99$	$0.35\bar{X}+0.10$
Bis(2-chloroethoxy)methane	1.12C−5.04	$0.16\bar{X}+1.34$	$0.26\bar{X}+2.01$
Bis(2-chloroisopropyl) ether*	1.03C−2.31	$0.24\bar{X}+0.28$	$0.25\bar{X}+1.04$
Bis(2-ethylhexyl) phthalate	0.84C−1.18	$0.26\bar{X}+0.73$	$0.36\bar{X}+0.67$
4-Bromophenyl phenyl ether	0.91C−1.34	$0.13\bar{X}+0.66$	$0.16\bar{X}+0.66$
2-Chloronaphthalene	0.89C+0.01	$0.07\bar{X}+0.52$	$0.13\bar{X}+0.34$
4-Chlorophenyl phenyl ether	0.91C+0.53	$0.20\bar{X}-0.94$	$0.30\bar{X}-0.46$
Chrysene	0.93C−1.00	$0.28\bar{X}+0.13$	$0.33\bar{X}-0.09$
4,4'-DDD	0.56C−0.40	$0.29\bar{X}-0.32$	$0.66\bar{X}-0.96$
4,4'-DDE	0.70C−0.54	$0.26\bar{X}-1.17$	$0.39\bar{X}-1.04$
4,4'-DDT	0.79C−3.28	$0.42\bar{X}+0.19$	$0.65\bar{X}-0.58$
Dibenzo(a,h)anthracene	0.88C+4.72	$0.30\bar{X}+8.51$	$0.59\bar{X}+0.25$
Di-n-butyl phthalate	0.59C+0.71	$0.13\bar{X}+1.16$	$0.39\bar{X}+0.60$
1,2-Dichlorobenzene	0.80C+0.28	$0.20\bar{X}+0.47$	$0.24\bar{X}+0.39$
1,3-Dichlorobenzene	0.86C−0.70	$0.25\bar{X}+0.68$	$0.41\bar{X}+0.11$
1,4-Dichlorobenzene	0.73C−1.47	$0.24\bar{X}+0.23$	$0.29\bar{X}+0.36$
3,3'-Dichlorobenzidine	1.23C−12.65	$0.28\bar{X}+7.33$	$0.47\bar{X}+3.45$
Dieldrin	0.82C−0.16	$0.20\bar{X}-0.16$	$0.26\bar{X}-0.07$
Diethyl phthalate	0.43C+1.00	$0.28\bar{X}+1.44$	$0.52\bar{X}+0.22$
Dimethyl phthalate	0.20C+1.03	$0.54\bar{X}+0.19$	$1.05\bar{X}-0.92$
2,4-Dinitrotoluene	0.92C−4.81	$0.12\bar{X}+1.06$	$0.21\bar{X}+1.50$
2,6-Dinitrotoluene	1.06C−3.60	$0.14\bar{X}+1.26$	$0.19\bar{X}+0.35$
Di-n-octyl phthalate	0.76C−0.79	$0.21\bar{X}+1.19$	$0.37\bar{X}+1.19$
Endosulfan sulfate	0.39C+0.41	$0.12\bar{X}+2.47$	$0.63\bar{X}-1.03$
Endrin aldehyde	0.76C−3.86	$0.18\bar{X}+3.91$	$0.73\bar{X}-0.62$
Fluoranthene	0.81C+1.10	$0.22\bar{X}-0.73$	$0.28\bar{X}-0.60$
Fluorene	0.90C−0.00	$0.12\bar{X}+0.26$	$0.13\bar{X}+0.61$
Heptachlor	0.87C−2.97	$0.24\bar{X}-0.56$	$0.50\bar{X}-0.23$
Heptachlor epoxide	0.92C−1.87	$0.33\bar{X}-0.46$	$0.28\bar{X}+0.64$
Hexachlorobenzene	0.74C+0.66	$0.18\bar{X}-0.10$	$0.43\bar{X}-0.52$
Hexachlorobutadiene	0.71C−1.01	$0.19\bar{X}+0.92$	$0.26\bar{X}+0.49$
Hexachloroethane	0.73C−0.83	$0.17\bar{X}+0.67$	$0.17\bar{X}+0.80$
Indeno(1,2,3-cd)pyrene	0.78C−3.10	$0.29\bar{X}+1.46$	$0.50\bar{X}+0.44$
Isophorone	1.12C+1.41	$0.27\bar{X}+0.77$	$0.33\bar{X}+0.26$
Naphthalene	0.76C+1.58	$0.21\bar{X}-0.41$	$0.30\bar{X}-0.68$
Nitrobenzene	1.09C−3.05	$0.19\bar{X}+0.92$	$0.27\bar{X}+0.21$
N-Nitrosodi-n-propylamine	1.12C−6.22	$0.27\bar{X}+0.68$	$0.44\bar{X}+0.47$
PCB–1260	0.81C−10.86	$0.35\bar{X}+3.61$	$0.43\bar{X}+1.82$
Phenanthrene	0.87C−0.06	$0.12\bar{X}+0.57$	$0.15\bar{X}+0.25$
Pyrene	0.84C−0.16	$0.16\bar{X}+0.06$	$0.15\bar{X}+0.31$
1,2,4-Trichlorobenzene	0.94C−0.79	$0.15\bar{X}+0.85$	$0.21\bar{X}+0.39$
4-Chloro-3-methylphenol	0.84C+0.35	$0.23\bar{X}+0.75$	$0.29\bar{X}+1.31$
2-Chlorophenol	0.78C+0.29	$0.18\bar{X}+1.46$	$0.28\bar{X}+0.97$
2,4-Dichlorophenol	0.87C+0.13	$0.15\bar{X}+1.25$	$0.21\bar{X}+1.28$
2,4-Dimethylphenol	0.71C+4.41	$0.16\bar{X}+1.21$	$0.22\bar{X}+1.31$
2,4-Dinitrophenol	0.81C−18.04	$0.38\bar{X}+2.36$	$0.42\bar{X}+26.29$
2-Methyl-4,6-Dinitrophenol	1.04C−28.04	$0.05\bar{X}+42.29$	$0.26\bar{X}+23.10$
2-Nitrophenol	1.07C−1.15	$0.16\bar{X}+1.94$	$0.27\bar{X}+2.60$
4-Nitrophenol	0.61C−1.22	$0.38\bar{X}+2.57$	$0.44\bar{X}+3.24$
Pentachlorophenol	0.93C+1.99	$0.24\bar{X}+3.03$	$0.30\bar{X}+4.33$
Phenol	0.43C+1.26	$0.26\bar{X}+0.73$	$0.35\bar{X}+0.58$
2,4,6-Trichlorophenol	0.91C−0.18	$0.16\bar{X}+2.22$	$0.22\bar{X}+1.81$

X'=Expected recovery for one or more measurements of a sample containing a concentration of C, in μg/L.
s_r'=Expected single analyst standard deviation of measurements at an average concentration found of $\bar{X}$, in μg/L.
S'=Expected interlaboratory standard deviation of measurements at an average concentration found of $\bar{X}$, in μg/L.
C=True value for the concentration, in μg/L.

$\bar{X}$=Average recovery found for measurements of samples containing a concentration of C, in μg/L.
[1] The proper chemical name is 2,2'oxybis(1-chloropropane).

TABLE 8.—SUGGESTED INTERNAL AND SURROGATE STANDARDS

Base/neutral fraction	Acid fraction
Aniline-d_5	2-Fluorophenol.
Anthracene-d_{10}	Pentafluorophenol.
Benzo(a)anthracene-d_{12}	Phenol-d_5
4,4'-Dibromobiphenyl	2-Perfluoromethyl phenol.
4,4'-Dibromooctafluorobiphenyl.	
Decafluorobiphenyl	
2,2^1-Difluorobiphenyl	
4-Fluoroaniline	
1-Fluoronaphthalene	
2-Fluoronaphthalene	
Naphthalene-d_8	
Nitrobenzene-d_5	
2,3,4,5,6-Pentafluorobiphenyl	
Phenanthrene-d_{10}	
Pyridine-d_5	

TABLE 9.—DFTPP KEY MASSES AND ABUNDANCE CRITERIA

Mass	m/z Abundance criteria
51	30–60 percent of mass 198.
68	Less than 2 percent of mass 69.
70	Less than 2 percent of mass 69.
127	40–60 percent of mass 198.
197	Less than 1 percent of mass 198.
198	Base peak, 100 percent relative abundance.
199	5–9 percent of mass 198.
275	10–30 percent of mass 198.
365	Greater than 1 percent of mass 198.
441	Present but less than mass 443.
442	Greater than 40 percent of mass 198.
443	17–23 percent of mass 442.

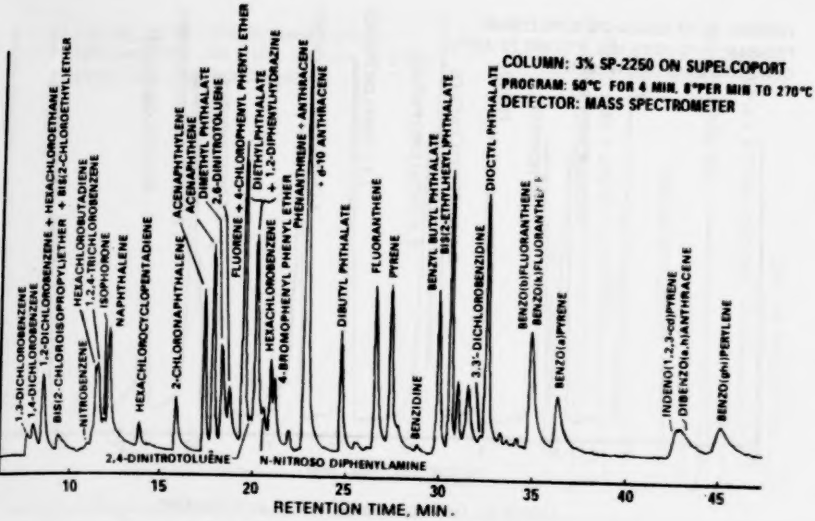


Figure 1. Gas chromatogram of base/neutral fraction.

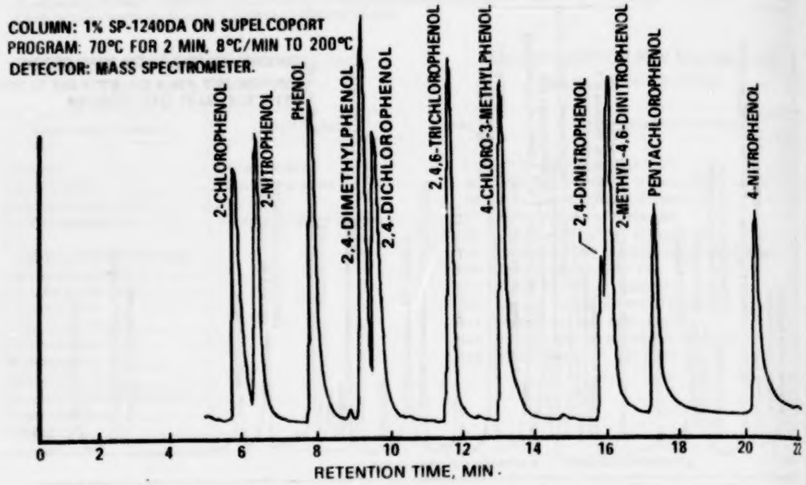


Figure 2. Gas chromatogram of acid fraction.

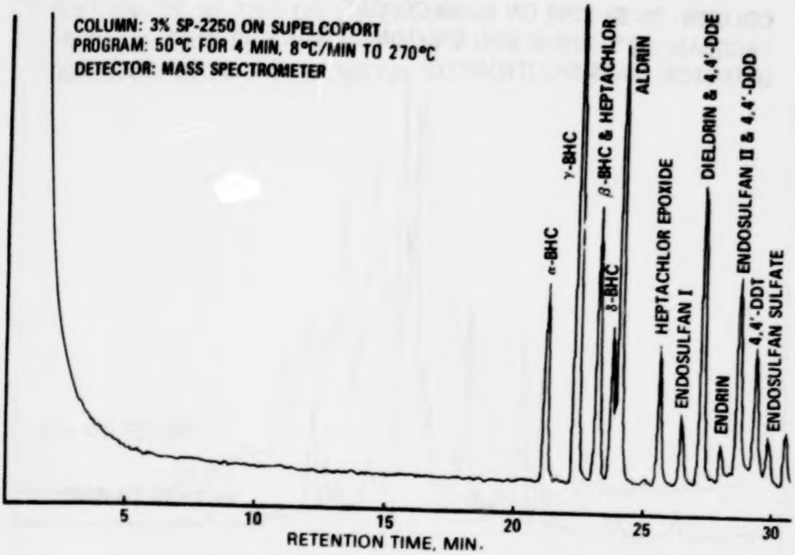


Figure 3. Gas chromatogram of pesticide fraction.

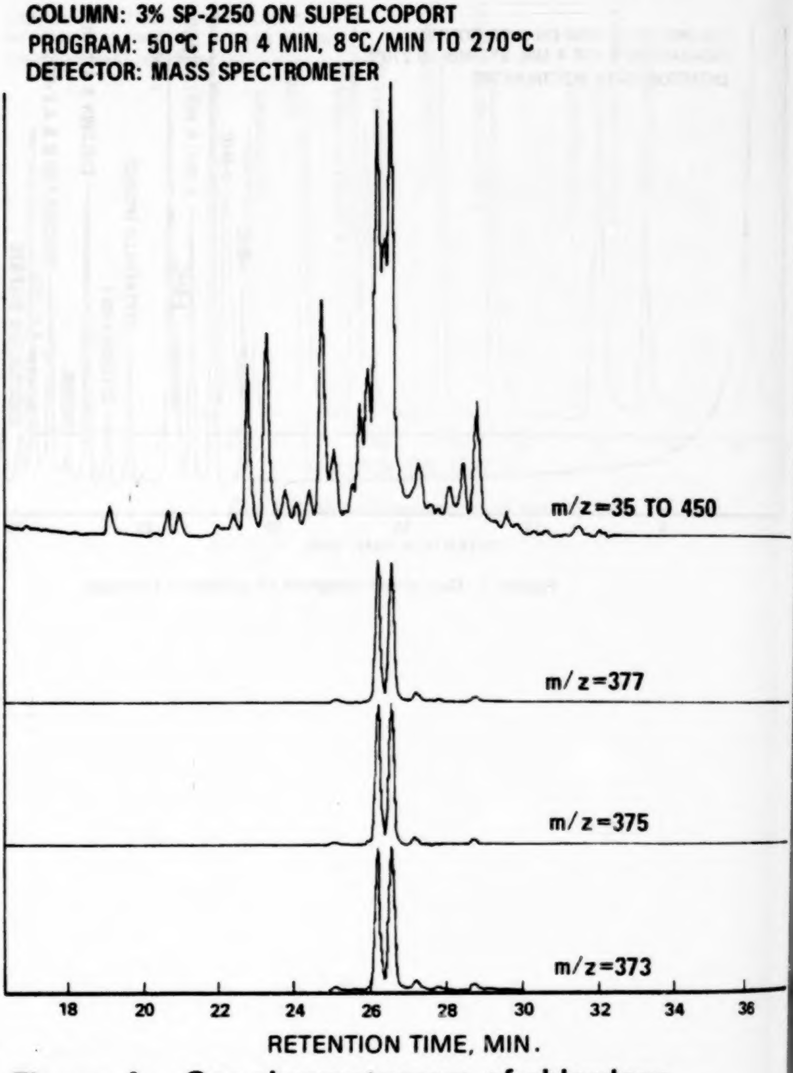


Figure 4. Gas chromatogram of chlordane.

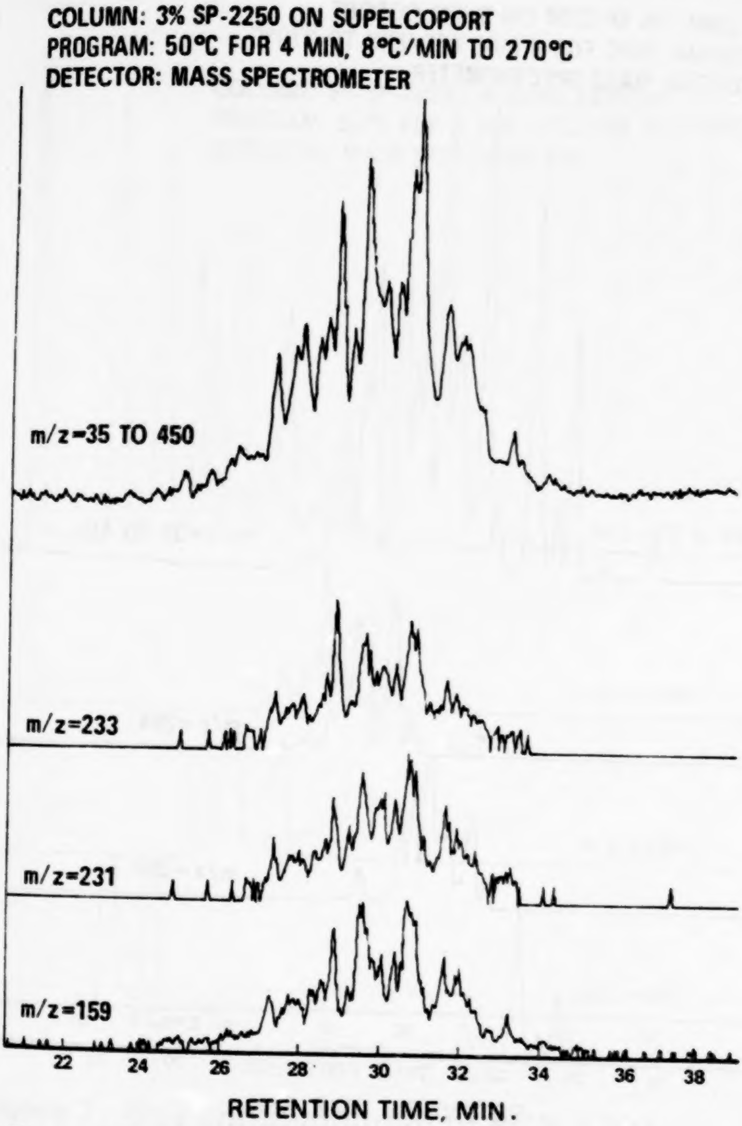


Figure 5. Gas chromatogram of toxaphene.

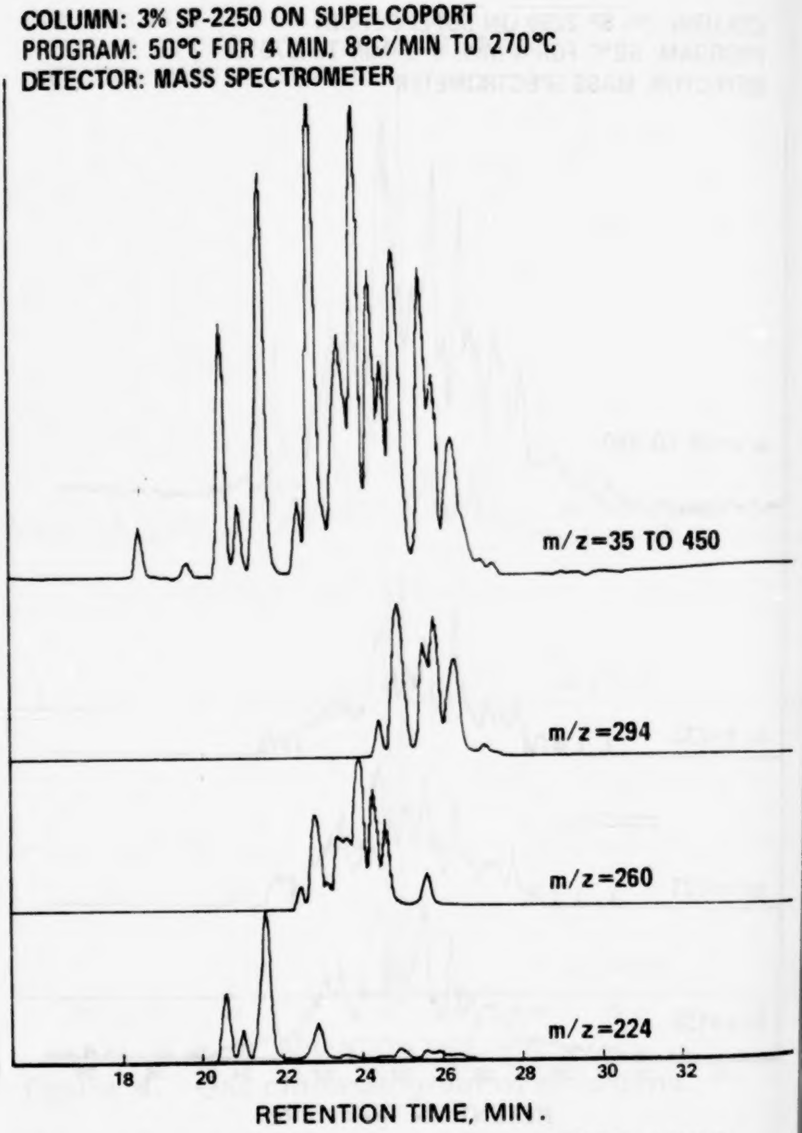


Figure 6. Gas chromatogram of PCB-1016.

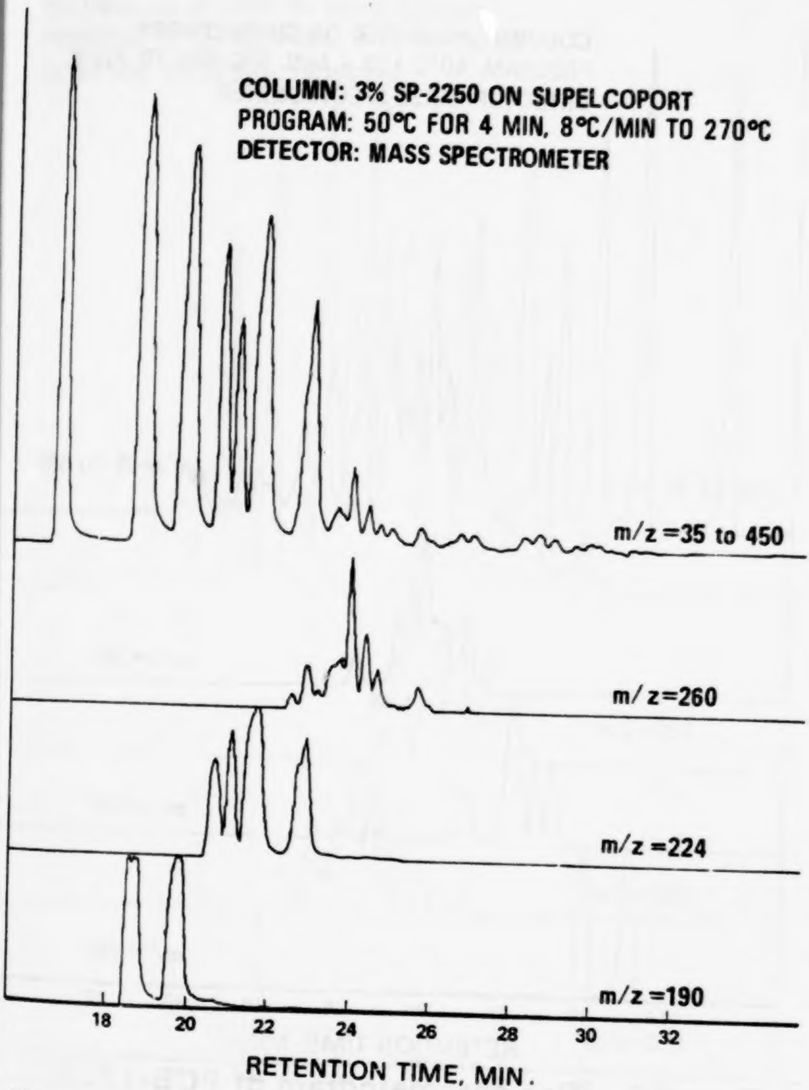


Figure 7. Gas chromatogram of PCB-1221.

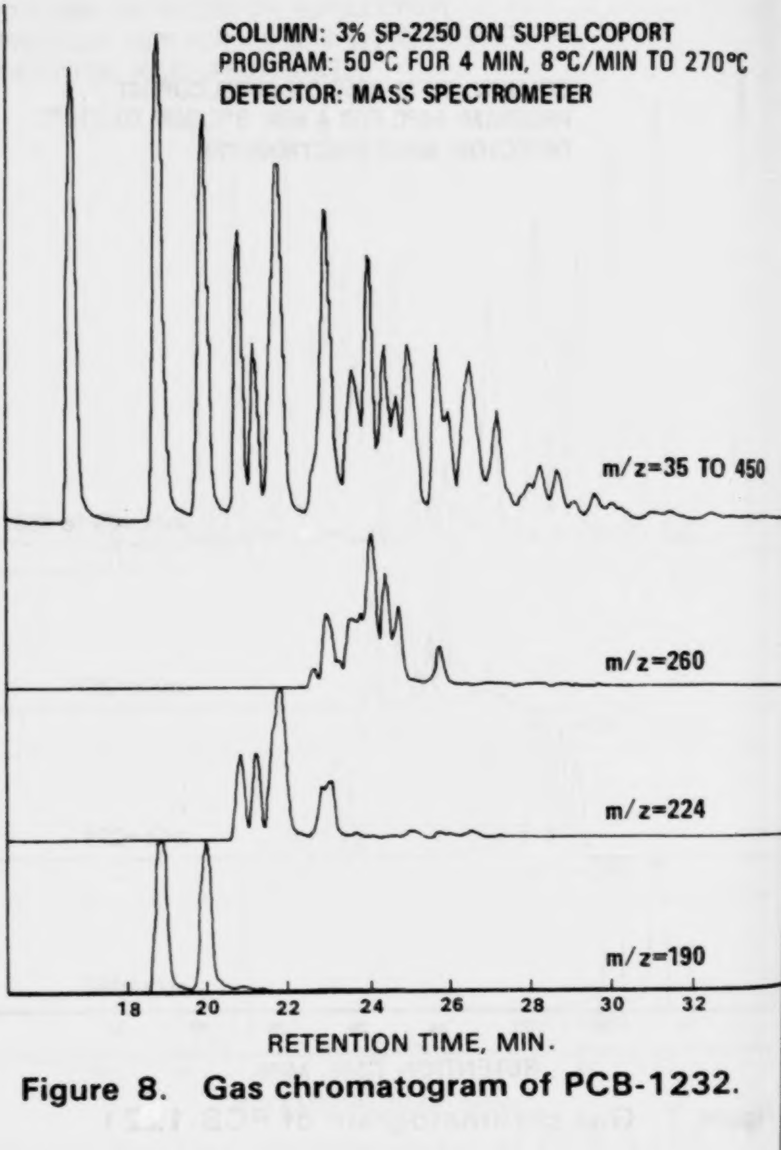


Figure 8. Gas chromatogram of PCB-1232.

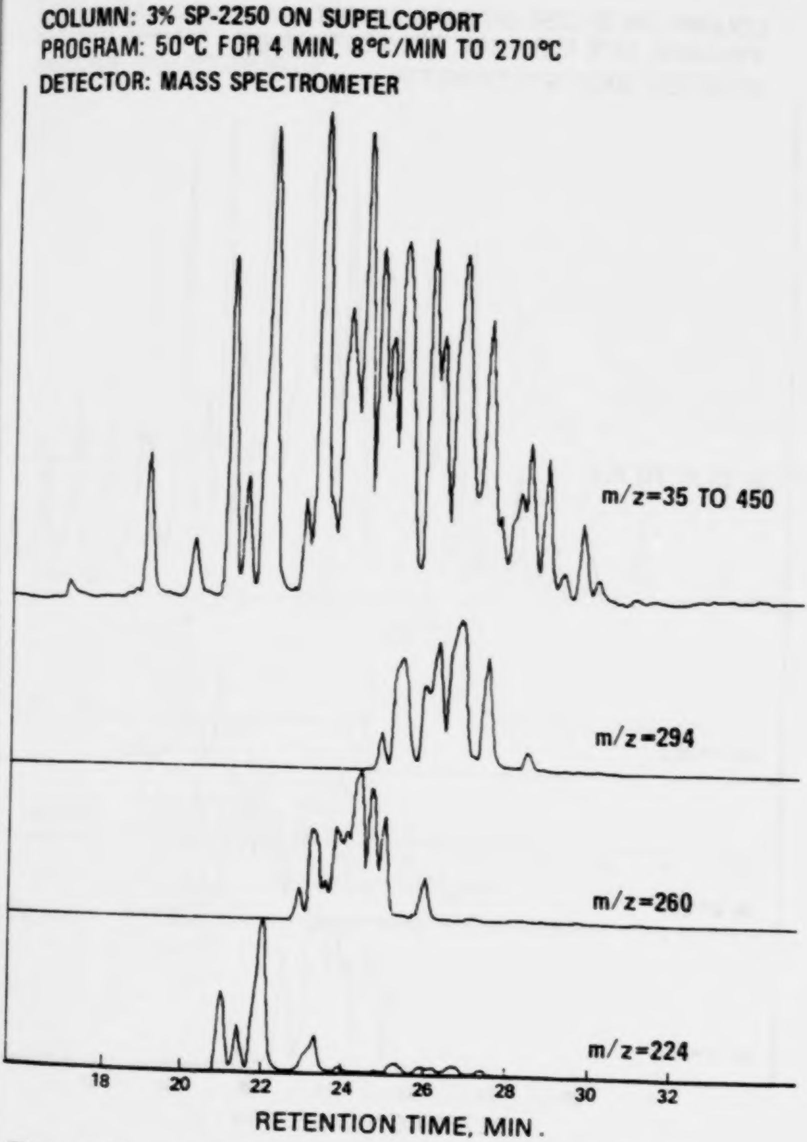


Figure 9. Gas chromatogram of PCB-1242.

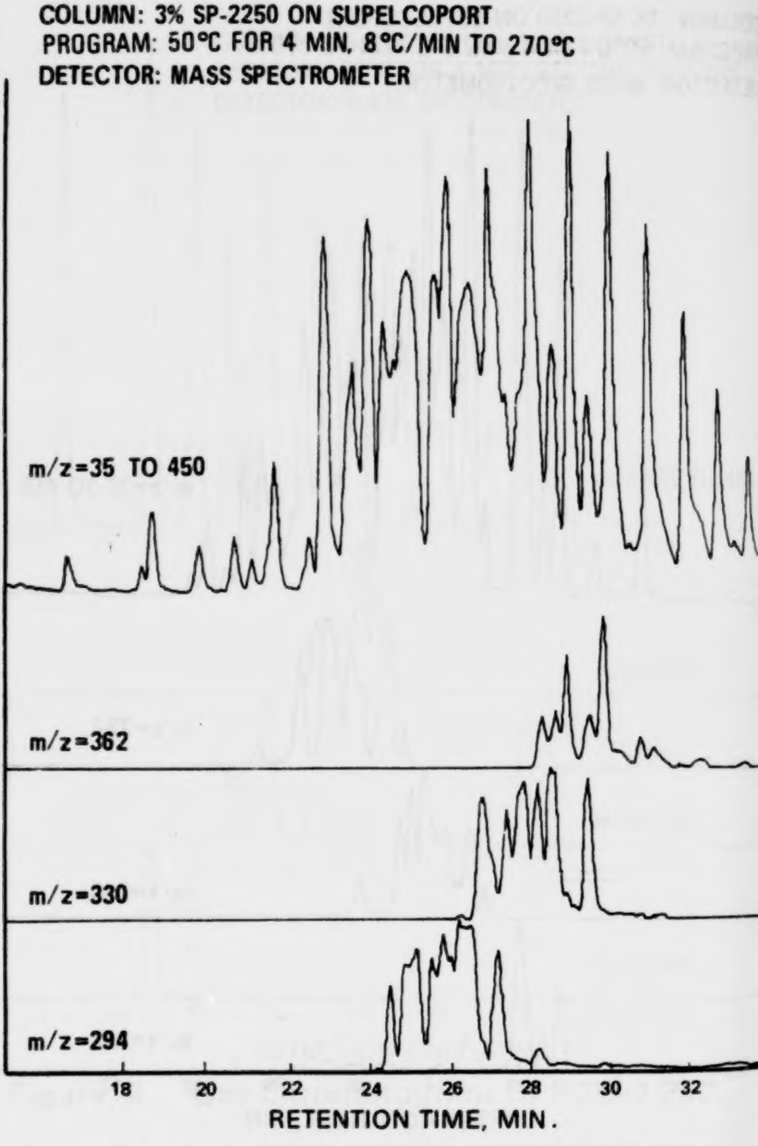


Figure 10. Gas chromatogram of PCB-1248.

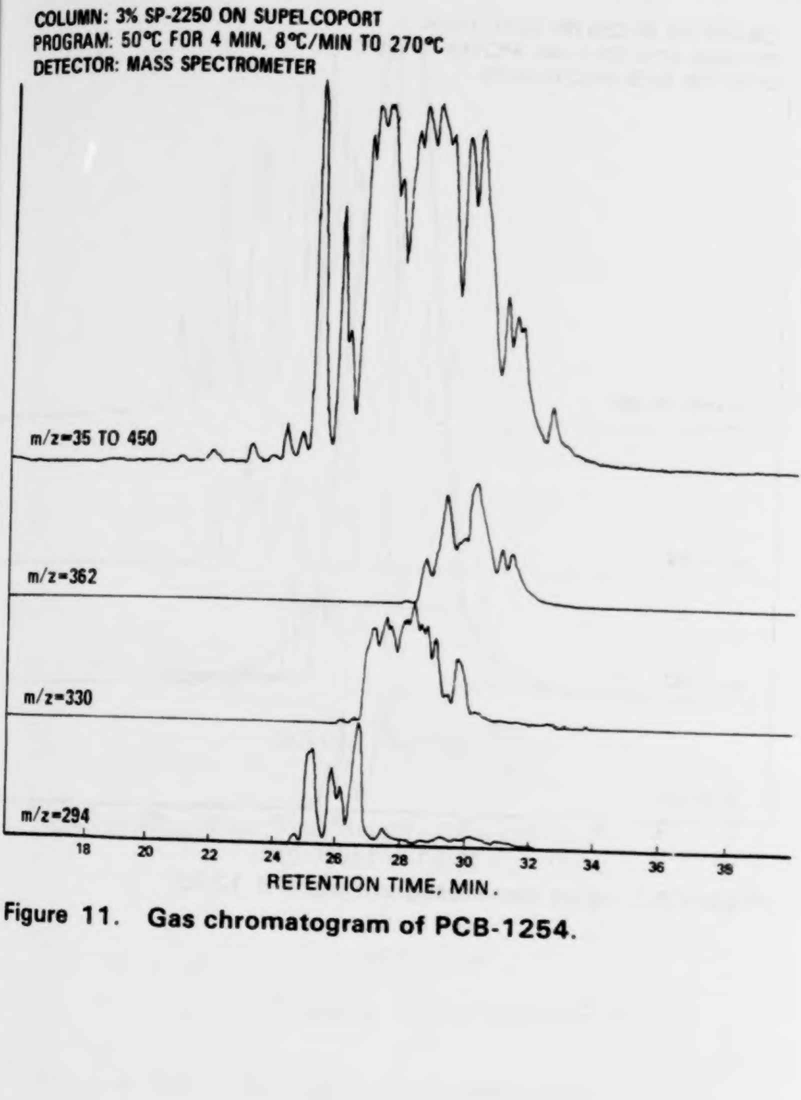


Figure 11. Gas chromatogram of PCB-1254.

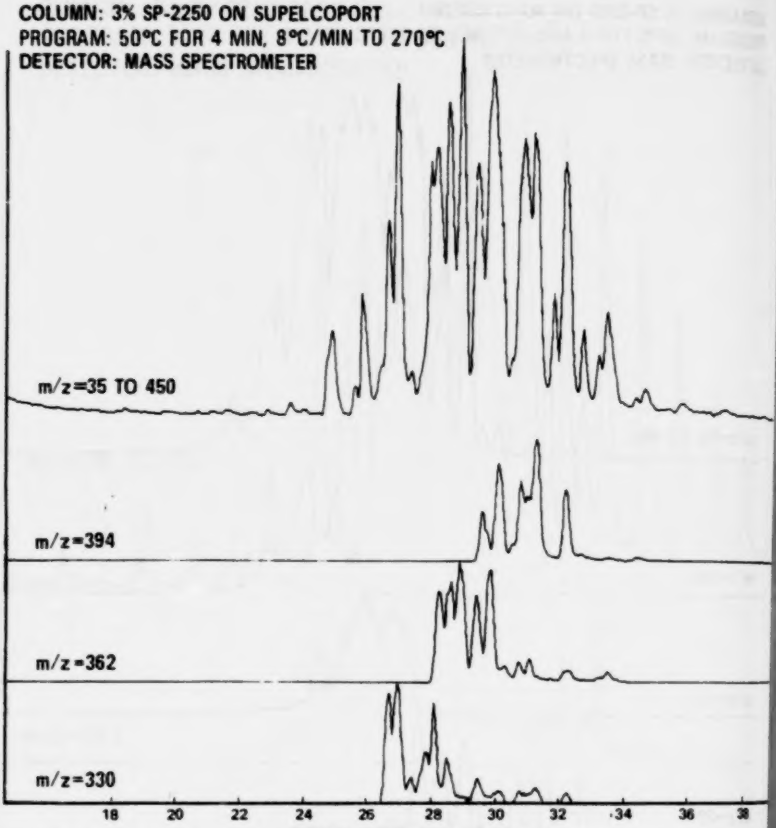
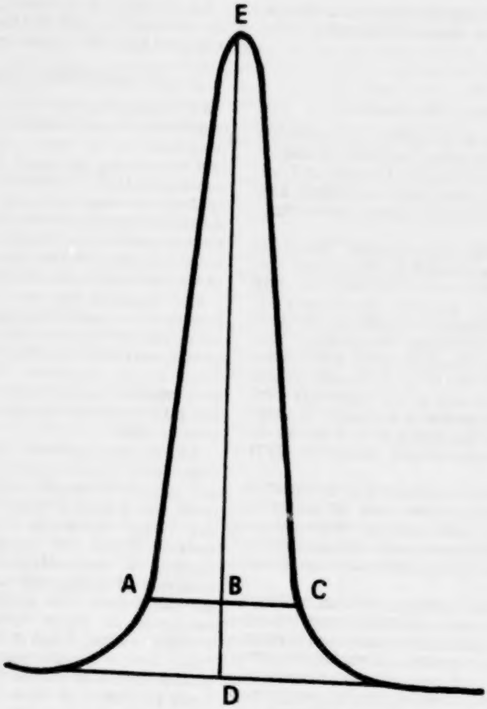

COLUMN: 3% SP-2250 ON SUPELCOPORT
PROGRAM: 50°C FOR 4 MIN, 8°C/MIN TO 270°C
DETECTOR: MASS SPECTROMETER

Figure 12. Gas chromatogram of PCB-1260.



TAILING FACTOR= $\frac{BC}{AB}$

Example calculation: Peak Height = DE = 100 mm
10% Peak Height = BD = 10 mm
Peak Width at 10% Peak Height = AC = 23 mm
AB = 11 mm
BC = 12 mm

Therefore: Tailing Factor = $\frac{12}{11}$ = 1.1

Figure 13. Tailing factor calculation.

METHOD 1624 REVISION B—VOLATILE ORGANIC COMPOUNDS BY ISOTOPE DILUTION GC/MS

1. Scope and Application

1.1 This method is designed to determine the volatile toxic organic pollutants associated with the 1976 Consent Decree and additional compounds amenable to purge and trap gas chromatography-mass spectrometry (GC/MS).

1.2 The chemical compounds listed in table 1 may be determined in municipal and industrial discharges by this method. The methmd is designed to meet the survey requirements of Effluent Guidelines Division (EGD) and the National Pollutants Discharge Elimination System (NPDES) under 40 CFR 136.1 and 136.5. Any modifications of this method, beyond those expressly permitted, shall be considered as major modifications subject to application and approval of alternate test procedures under 40 CFR 136.4 and 136.5.

1.3 The detection limit of this method is usually dependent on the level of interferences rather than instrumental limitations. The limits in table 2 represent the minimum quantity that can be detected with no interferences present.

1.4 The GC/MS portions of this method are for use only by analysts experienced with GC/MS or under the close supervision of such qualified persons. Laboratories unfamiliar with the analyses of environmental samples by GC/MS should run the performance tests in reference 1 before beginning.

2. Summary of Method

2.1 Stable isotopically labeled analogs of the compounds of interest are added to a 5 mL water sample. The sample is purged at 20-25 °C with an inert gas in a specially designed chamber. The volatile organic compounds are transferred from the aqueous phase into the gaseous phase where they are passed into a sorbent column and trapped. After purging is completed, the trap is backflushed and heated rapidly to desorb the compounds into a gas chromatograph (GC). The compounds are separated by the GC and detected by a mass spectrometer (MS) (references 2 and 3). The labeled compounds serve to correct the variability of the analytical technique.

2.2 Identification of a compound (qualitative analysis) is performed by comparing the GC retention time and the background corrected characteristic spectral masses with those of authentic standards.

2.3 Quantitative analysis is performed by GC/MS using extracted ion current profile (EICP) areas. Isotope dilution is used when labeled compounds are available; otherwise, an internal standard method is used.

2.4 Quality is assured through reproducible calibration and testing of the purge and trap and GC/MS systems.

3. Contamination and Interferences

3.1 Impurities in the purge gas, organic compounds out-gassing from the plumbing upstream of the trap, and solvent vapors in the laboratory account for the majority of contamination problems. The analytical system is demonstrated to be free from interferences under conditions of the analysis by analyzing blanks initially and with each sample lot (samples analyzed on the same 8 hr shift), as described in Section 8.5.

3.2 Samples can be contaminated by diffusion of volatile organic compounds (particularly methylene chloride) through the bottle seal during shipment and storage. A field blank prepared from reagent water and carried through the sampling and handling protocol serves as a check on such contamination.

3.3 Contamination by carry-over can occur when high level and low level samples are analyzed sequentially. To reduce carry-over, the purging device and sample syringe are rinsed between samples with reagent water. When an unusually concentrated sample is encountered, it is followed by analysis of a reagent water blank to check for carry-over. For samples containing large amounts of water soluble materials, suspended solids, high boiling compounds, or high levels or purgeable compounds, the purge device is washed with soap solution, rinsed with tap and distilled water, and dried in an oven at 100-125 °C. The trap and other parts of the system are also subject to contamination; therefore, frequent bakeout and purging of the entire system may be required.

3.4 Interferences resulting from samples will vary considerably from source to source, depending on the diversity of the industrial complex or municipality being sampled.

4. Safety

4.1 The toxicity or carcinogenicity of each compound or reagent used in this method has not been precisely determined; however, each chemical compound should be treated as a potential health hazard. Exposure to these compounds should be reduced to the lowest possible level. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of data handling sheets should also be made available to all personnel involved in these analyses. Additional information on laboratory safety can be found in references 4-6.

4.2 The following compounds covered by this method have been tentatively classified s known or suspected human or mammali- n carcinogens: benzene, carbon tetrachlo- de, chloroform, and vinyl chloride. Pri- ary standards of these toxic compounds hould be prepared in a hood, and a IOSH/MESA approved toxic gas respira- r should be worn when high concentra- ons are handled.

5. *Apparatus and Materials*

.1 Sample bottles for discrete sampling.

.1.1 Bottle—25 to 40 mL with screw cap ierce 13075, or equivalent). Detergent sh, rinse with tap and distilled water, and y at >105 °C for one hr minimum before e.

.1.2 Septum—Teflon-faced silicone ierce 12722, or equivalent), cleaned as ove and baked at 100-200 °C, for one hour nimum.

.2 Purge and trap device—consists of rging device, trap, and desorber. Com- te devices are commercially available.

.2.1 Purging device—designed to accept nL samples with water column at least 3 deep. The volume of the gaseous head ce between the water and trap shall be than 15 mL. The purge gas shall be in- duced less than 5 mm from the base of water column and shall pass through water as bubbles with a diameter less n 3 mm. The purging device shown in ure 1 meets these criteria.

2.2 Trap—25 to 30 cm x 2.5 mm i.d. min- m, containing the following:

2.2.1 Methyl silicone packing—one ± cm, 3 percent OV-1 on 60/80 mesh Chro- sorb W, or equivalent.

2.2.2 Porous polymer—15 ± 1.0 cm, ax GC (2,6-diphenylene oxide polymer), 80 mesh, chromatographic grade, or ivalent.

2.2.3 Silica gel—8 ± 1.0 cm, Davison mical, 35/60 mesh, grade 15, or equiva- . The trap shown in Figure 2 meets e specifications.

.3 Desorber—shall heat the trap to 175 °C in 45 seconds or less. The polymer ion of the trap shall not exceed 180 °C, the remaining sections shall not exceed °C. The desorber shown in Figure 2 ts these specifications.

.4 The purge and trap device may be a rate unit or coupled to a GC as shown igures 3 and 4.

Gas chromatograph—shall be linearly perature programmable with initial and holds, shall contain a glass jet separa- s the MS interface, and shall produce ts which meet the calibration (Section uality assurance (Section 8), and per- ance tests (Section 11) of this method.

.1 Column—2.8 ± 0.4 m x 2 ± 0.5 mm glass, packekd with one percent SP- on Carbopak B, 60/80 mesh, or equiva-

5.4 Mass spectrometer—70 eV electron impact ionization; shall repetitively scan from 20 to 250 amu every 2-3 seconds, and produce a unit resolution (valleys between m/z 174-176 less than 10 percent of the height of the m/z 175 peak), background corrected mass spectrum from 50 ng 4-bromo-fluorobenzene (BFB) injected into the GC. The BFB spectrum shall meet the mass-intensity criteria in Table 3. All portions of the GC column, transfer lines, and separator which connect the GC column to the ion source shall remain at or above the column temperature during analysis to preclude condensation of less volatile compounds.

5.5 Data system—shall collect and record MS data, store mass intensity data in spectral libraries, process GC/MS data and generate reports, and shall calculate and record response factors.

5.5.1 Data acquisition—mass spectra shall be collected continuously throughout the analysis and stored on a mass storage device.

5.5.2 Mass spectral libraries—user created libraries containing mass spectra obtained from analysis of authentic standards shall be employed to reverse search GC/MS runs for the compounds of interest (Section 7.2).

5.5.3 Data processing—the data system shall be used to search, locate, identify, and quantify the compounds of interest in each GC/MS analysis. Software routines shall be employed to compute retention times and EICP areas. Displays of spectra, mass chromatograms, and library comparisons are required to verify results.

5.5.4 Response factors and multipoint calibrations—the data system shall be used to record and maintain lists of response factors (response ratios for isotope dilution) and generate multi-point calibration curves (Section 7). Computations of relative standard deviation (coefficient of variation) are useful for testing calibration linearity. Statistics on initial and on-going performance shall be maintained (Sections 8 and 11).

5.6 Syringes—5 mL glass hypodermic, with Luer-lok tips.

5.7 Micro syringes—10, 25, and 100 uL.

5.8 Syringe valves—2-way, with Luer ends (Telfon or Kel-F).

5.9 Syringe—5 mL, gas-tight, with shut-off valve.

5.10 Bottles—15 mL, screw-cap with Telfon liner.

5.11 Balance—analytical, capable of weighing 0.1 mg.

6. *Reagents and Standards*

6.1 Reagent water—water in which the compounds of interest and interfering compounds are not detected by this method

(Section 11.7). It may be generated by any of the following methods:

6.1.1 Activated carbon—pass tap water through a carbon bed (Calgon Filtrasorb-300, or equivalent).

6.1.2 Water purifier—pass tap water through a purifier (Millipore Super Q, or equivalent).

6.1.3 Boil and purge—heat tap water to 90-100 °C and bubble contaminant free inert gas through it for approx one hour. While still hot, transfer the water to screw-cap bottles and seal with a Teflon-lined cap.

6.2 Sodium thiosulfate—ACS granular.

6.3 Methanol—pesticide quality or equivalent.

6.4 Standard solutions—purchased as solution or mixtures with certification to their purity, concentration, and authenticity, or prepared from materials of known purity and composition. If compound purity is 96 percent or greater, the weight may be used without correction to calculate the concentration of the standard.

6.5 Preparation of stock solutions—prepare in methanol using liquid or gaseous standards per the steps below. Observe the safety precautions given in Section 4.

6.5.1 Place approx 9.8 mL of methanol in a 10 mL ground glass stoppered volumetric flask. Allow the flask to stand unstoppered for approximately 10 minutes or until all methanol wetted surfaces have dried. In each case, weigh the flask, immediately add the compound, then immediately reweigh to prevent evaporation losses from affecting the measurement.

6.5.1.1 Liquids—using a 100 µL syringe, permit 2 drops of liquid to fall into the methanol without contacting the leck of the flask. Alternatively, inject a known volume of the compound into the methanol in the flask using a micro-syringe.

6.5.1.2 Gases (chloromethane, bromomethane, chloroethane, vinyl chloride)—fill a valved 5 mL gas-tight syringe with the compound. Lower the needle to approximately 5 mm above the methanol meniscus. Slowly introduce the compound above the surface of the meniscus. The gas will dissolve rapidly in the methanol.

6.5.2 Fill the flask to volume, stopper, then mix by inverting several times. Calculate the concentration in mg/mL (µg/µL) from the weight gain (or density if a known volume was injected).

6.5.3 Transfer the stock solution to a Teflon sealed screw-cap-bottle. Store, with minimal headspace, in the dark at −10 to −20 °C.

6.5.4 Prepare fresh standards weekly for the gases and 2-chloroethylvinyl ether. All other standards are replaced after one month, or sooner if comparison with check standards indicate a change in concentration. Quality control check standards that can be used to determine the accuracy of calibration standards are available from US Environmental Protection Agency, En ronmental Monitoring and Support Labo tory, Cincinnati, Ohio.

6.6 Labeled compound spiking solutio from stock standard solutions prepared above or from mixtures, prepare the sp ing solution to contain a concentration s that a 5-10 µL spike into each 5 mL sam blank, or aqueous standard analyzed result in a concentration of 20 µg/L of e labeled compound. For the gases and for t water soluble compounds (acrolein, acryl trile, acetone, diethyl ether, and MEK), concentration of 100 µg/L may be used. clude the internal standards (Section 7.5) this solution so that a concentration of µg/L in each sample, blank, or aque standard will be produced.

6.7 Secondary standards—using stock lutions, prepare a secondary standard methanol to contain each pollutant a concentration of 500 µg/mL For the ga and water soluble compounds (Section a concentration of 2.5 mg/mL may be u

6.7.1 Aqueous calibration standar using a 25 µL syringe, add 20 µL of the ondary standard (Section 6.7) to 50, 200, 500, and 1000 mL of reagent wate produce concentrations of 200, 100, 50, and 10 µg/L, respectively. If the higher c centration standard for the gases and w soluble compounds was chosen (Section these compounds will be at concentrati of 1000, 500, 250, 100, and 50 µg/L in aqueous calibration standards.

6.7.2 Aqueous performance standard- aqueous standard containing all pollut internal standards, labeled compounds, BFB is prepared daily, and analyzed shift to demonstrate performance (Sec 11). This standard shall contain either 100 µg/L of the labeled and pollutant and water soluble compounds, 10 µg/L and 20 µg/L of all other pollutants, lab compounds, and internal standards. It be the nominal 20 µg/L aqueous calibr standard (Section 6.7.1).

6.7.3 A methanolic standard conta all pollutants and internal standards is pared to demonstrate recovery of these pounds when syringe injection and p and trap analyses are compared. This s ard shall contain either 100 µg/mL or µg/mL of the gases and water soluble pounds, and 100 µg/mL of the rema pollutants and internal standards (co ent with the amounts in the aqueous formance standard in 6.7.2).

6.7.4 Other standards which may needed are those for test of BFB perf ance (Section 7.1) and for collection of spectra for storage in spectral libraries tion 7.2).

7. *Calibration*

7.1 Assemble the gas chromatographic apparatus and establish operating conditions given in table 2. By injecting standards into the GC, demonstrate that the analytical system meets the detection limits in table 2 and the mass-intensity criteria in table 3 for 50 ng BFB.

7.2 Mass spectral libraries—detection and identification of the compound of interest are dependent upon the spectra stored in user created libraries.

7.2.1. Obtained a mass spectrum of each pollutant and labeled compound and each internal standard by analyzing an authentic standard either singly or as part of a mixture in which there is no interference between closely eluted components. That only a single compound is present is determined by examination of the spectrum. Fragments not attributable to the compound under study indicate the presence of an interfering compound. Adjust the analytical conditions and scan rate (for this test only) to produce an undistorted spectrum at the GC peak maximum. An undistorted spectrum will usually be obtained if five complete spectra are collected across the upper half of the GC peak. Software algorithms designed to "enhance" the spectrum may eliminate distortion, but may also eliminate authentic m/z's or introduce other distortion.

7.2.3 The authentic reference spectrum is obtained under BFB tuning conditions (Section 7.1 and table 3) to normalize it to spectra from other instruments.

7.2.4 The spectrum is edited by saving the 5 most intense mass spectral peaks and all other mass spectral peaks greater than 10 percent of the base peak. This spectrum is stored for reverse search and for compound confirmation.

7.3 Assemble the purge and trap device. Pack the trap as shown in Figure 2 and condition overnight at 170-180 °C by backflushing with an inert gas at a flow rate of 20-30 mL/min. Condition traps daily for a minimum of 10 minutes prior to use.

7.3.1 Analyze the aqueous performance standard (Section 6.7.2) according to the purge and trap procedure in Section 10. Compute the area at the primary m/z (table 4) for each compound. Compare these areas to those obtained by injecting one μL of the methanolic standard (Section 6.7.3) to determine compound recovery. The recovery shall be greater than 20 percent for the water soluble compounds, and 60-110 percent for all other compounds. This recovery is demonstrated initially for each purge and trap GC/MS system. The test is repeated only if the purge and trap or GC/MS systems are modified in any way that might result in a change in recovery.

7.3.2 Demonstrate that 100 ng toluene (or toluene-d8) produces an area at m/z 91 (or 99) approx one-tenth that required to exceed the linear range of the system. The exact value must be determined by experience for each instrument. It is used to match the calibration range of the instrument to the analytical range and detection limits required.

7.4 Calibration by isotope dilution—the isotope dilution approach is used for the purgeable organic compounds when appropriate labeled compounds are available and when interferences do not preclude the analysis. If labeled compounds are not available, or interferences are present, internal standard methods (Section 7.5 or 7.6) are used. A calibration curve encompassing the concentration range of interest is prepared for each compound determined. The relative response (RR) vs concentration (μg/L) is plotted or computed using a linear regression. An example of a calibration curve for toluene using toluene-d8 is given in figure 5. Also shown are the ±10 percent error limits (dotted lines). Relative response is determined according to the procedures described below. A minimum of five data points are required for calibration (Section 7.4.4).

7.4.1 The relative response (RR) of pollutant to labeled compound is determined from isotope ratio values calculated from acquired data. Three isotope ratios are used in this process:

R_x = the isotope ratio measured in the pure pollutant (figure 6A).

R_y = the isotope ratio of pure labeled compound (figure 6B).

R_m = the isotope ratio measured in the analytical mixture of the pollutant and labeled compounds (figure 6C).

The correct way to calculate RR is: $RR=(R_y-R_m)(R_x+1)/(R_m-R_x)(R_y+1)$ If R_m is not between $2R_y$ and $0.5R_x$, the method does not apply and the sample is analyzed by internal or external standard methods (Section 7.5 or 7.6).

7.4.2 In most cases, the retention times of the pollutant and labeled compound are the same and isotope ratios (R's) can be calculated from the EICP areas, where: $R=(\text{area at } m_1/z)/(\text{area at } m_2/z)$ If either of the areas is zero, it is assigned a value of one in the calculations; that is, if: area of $m_1/z=50721$, and area of $m_2/z=0$, then $R=50721/1=50720$. The m/z's are always selected such that $R_x>R_y$. When there is a difference in retention times (RT) between the pollutant and labeled compounds, special precautions are required to determine the isotope ratios.

R_x, R_y, and R_m are defined as follows:

$R_x=[\text{area } m_1/z \text{ (at } RT_1)]/1$

$R_y=1/[\text{area } m_2/z \text{ (at } RT_2)]$

R_m=[area m_1/z (at RT_1)]/[area m_2/z (at RT_2)]

7.4.3 An example of the above calculations can be taken from the data plotted in figure 6 for toluene and toluene-d8. For these data, R_x=168920/1=168900, R_y=1/60960=0.00001640, and R_m=96868/82508=1.174. The RR for the above data is then calculated using the equation given in Section 7.4.1. For the example, RR=1.174.

NOTE: Not all labeled compounds elute before their pollutant analogs.

7.4.4 To calibrate the analytical system by isotope dilution, analyze a 5 mL aliquot of each of the aqueous calibration standards (Section 6.7.1) spiked with an appropriate constant amount of the labeled compound spiking solution (Section 6.6), using the purge and trap procedure in section 10. Compute the RR at each concentration.

7.4.5 Linearity—if the ratio of relative response to concentration for any compound is constant (less than 20 percent coefficient of variation) over the 5 point calibration range, an averaged relative response/concentration ratio may be used for that compound; otherwise, the complete calibration curve for that compound shall be used over the 5 point calibration range.

7.5 Calibration by internal standard—used when criteria for isotope dilution (Section 7.4) cannot be met. The method is applied to pollutants having no labeled analog and to the labeled compounds. The internal standards used for volatiles analyses are bromochloromethane, 2-bromo-1-chloropropane, and 1,4-dichlorobutane. Concentrations of the labeled compounds and pollutants without labeled analogs are computed relative to the nearest eluted internal standard, as shown in table 2.

7.5.1 Response factors—calibration requires the determination of response factors (RF) which are defined by the following equation:

RF=(A_sxC_{is})/(A_{is}xC_s), where A_s is the EICP area at the characteristic m/z for the compound in the daily standard. A_{is} is the EICP area at the characteristic m/z for the internal standard.

C_{is} is the concentration (ug/L) of the internal standard

C_s is the concentration of the pollutant in the daily standard.

7.5.2 The response factor is determined at 10, 20, 50, 100, and 200 ug/L for the pollutants (optionally at five times these concentrations for gases and water soluble pollutants—see Section 6.7), in a way analogous to that for calibration by isotope dilution (Section 7.4.4). The RF is plotted against concentration for each compound in the standard (C_s) to produce a calibration curve.

7.5.3 Linearity—if the response factor (RF) for any compound is constant (less than 35 percent coefficient of variation) over the 5 point calibration range, an averaged response factor may be used for that compound; otherwise, the complete calibration curve for that compound shall be used over the 5 point range.

7.6 Combined calibration—by adding the isotopically labeled compounds and internal standards (Section 6.6) to the aqueous calibration standards (Section 6.7.1), a single set of analyses can be used to produce calibration curves for the isotope dilution and internal standard methods. These curves are verified each shift (Section 11.5) by purging the aqueous performance standard (Section 6.7.2). Recalibration is required only if calibration and on-going performance (Section 11.5) criteria cannot be met.

8. Quality Assurance/Quality Control

8.1 Each laboratory that uses this method is required to operate a formal quality assurance program. The minimum requirements of this program consist of an initial demonstration of laboratory capability, analysis of samples spiked with labeled compounds to evaluate and document data quality, and analysis of standards and blanks as tests of continued performance. Laboratory performance is compared to established performance criteria to determine if the results of analyses meet the performance characteristics of the method.

8.1.1 The analyst shall make an initial demonstration of the ability to generate acceptable accuracy and precision with this method. This ability is established as described in Section 8.2.

8.1.2 The analyst is permitted to modify this method to improve separations or lower the costs of measurements, provided all performance specifications are met. Each time a modification is made to the method, the analyst is required to repeat the procedure in Section 8.2 to demonstrate method performance.

8.1.3 Analyses of blanks are required to demonstrate freedom from contamination and that the compounds of interest and interfering compounds have not been carried over from a previous analysis (Section 3). The procedures and criteria for analysis of a blank are described in Sections 8.5 and 11.7.

8.1.4 The laboratory shall spike all samples with labeled compounds to monitor method performance. This test is described in Section 8.3. When results of these spikes indicate atypical method performance for samples, the samples are diluted to bring method performance within acceptable limits (Section 14.2).

8.1.5 The laboratory shall, on an ongoing basis, demonstrate through the analysis of the aqueous performance standard (Section 6.7.2) that the analysis system is in control. This procedure is described in Sections 11.1 and 11.5.

8.1.6 The laboratory shall maintain records to define the quality of data that is generated. Development of accuracy statements is described in Sections 8.4 and 11.5.2.

8.2 Initial precision and accuracy—to establish the ability to generate acceptable precision and accuracy, the analyst shall perform the following operations:

8.2.1 Analyze two sets of four 5-mL aliquots (8 aliquots total) of the aqueous performance standard (Section 6.7.2) according to the method beginning in Section 10.

8.2.2 Using results of the first set of four analyses in Section 8.2.1, compute the average recovery ($\bar{X}$) in μg/L and the standard deviation of the recovery (s) in μg/L for each compound, by isotope dilution for pollutants with a labeled analog, and by internal standard for labeled compounds and pollutants with no labeled analog.

8.2.3 For each compound, compare s and $\bar{X}$ with the corresponding limits for initial precision and accuracy found in table 5. If s and $\bar{X}$ for all compounds meet the acceptance criteria, system performance is acceptable and analysis of blanks and samples may begin. If individual $\bar{X}$ falls outside the range for accuracy, system performance is unacceptable for that compound.

NOTE: The large number of compounds in table 5 present a substantial probability that one or more will fail one of the acceptance criteria when all compoulds are analyzed. To determine if the analytical system is out of control, or if the failure can be attributed to probability, proceed as follows:

8.2.4 Using the results of the second set of four analyses, compute s and $\bar{X}$ for only those compounds which failed the test of the first set of four analyses (Section 8.2.3). If these compounds now pass, system performance is acceptable for all compounds and analysis of blanks and samples may begin. If, however, any of the same compounds fail again, the analysis system is not performing properly for the compound(s) in question. In this event, correct the problem and repeat the entire test (Section 8.2.1).

8.3 The laboratory shall spike all samples with labeled compounds to assess method performance on the sample matrix.

8.3.1 Spike and analyze each sample according to the method beginning in Section 10.

8.3.2 Compute the percent recovery (P) of the labeled compounds using the internal standard method (Section 7.5).

8.3.3 Compare the percent recovery for each compound with the corresponding labeled compound recovery limit in table 5. If the recovery of any compound falls outside its warning limit, method performance is unacceptable for that compound in that sample. Therefore, the sample matrix is complex and the sample is to be diluted and reanalyzed, per Section 14.2.

8.4 As part of the QA program for the laboratory, method accuracy for wastewater samples shall be assessed and records shall be maintained. After the analysis of five wastewater samples for which the labeled compounds pass the tests in Section 8.3.3, compute the average percent recovery (P) and the standard deviation of the percent recovery (s_p) for the labeled compounds only. Express the accuracy assessment as a percent recovery interval from $P-2s_p$ to $P+2s_p$. For example, if $P=90\%$ and $s_p=10\%$, the accuracy interval is expressed as 70–110%. Update the accuracy assessment for each compound on a regular basis (e.g. after each 5–10 new accuracy measurements).

8.5 Blanks—reagent water blanks are analyzed to demonstrate freedom from carry-over (Section 3) and contamination.

8.5.1 The level at which the purge and trap system will carry greater than 5 μg/L of a pollutant of interest (table 1) into a succeeding blank shall be determined by analyzing successively larger concentrations of these compounds. When a sample contains this concentration or more, a blank shall be analyzed immediately following this sample to demonstrate no carry-over at the 5 μg/L level.

8.5.2 With each sample lot (samples analyzed on the same 8 hr shift), a blank shall be analyzed immediately after analysis of the aqueous performance standard (Section 11.1) to demonstrate freedom from contamination. If any of the compounds of interest (table 1) or any potentially interfering compound is found in a blank at greater than 10 μg/L (assuming a response factor of 1 relative to the nearest eluted internal standard for compounds not listed in table 1), analysis of samples is halted until the source of contamination is eliminated and a blank shows no evidence of contamination at this level.

8.6 The specifications contained in this method can be met if the apparatus used is calibrated properly, then maintained in a calibrated state.

The standards used for calibration (Section 7), calibration verification (Section 11.5) and for initial (Section 8.2) and ongoing (Section 11.5) precision and accuracy should be identical, so that the most precise results will be obtained. The GC/MS instrument in particular will provide the most reproducible results if dedicated to the settings and conditions required for the analyses of volatiles by this method.

8.7 Depending on specific program requirements, field replicates may be collected to determine the precision of the sampling technique, and spiked samples may be required to determine the accuracy of the analysis when internal or external standard methods are used.

9. *Sample Collection, Preservation, and Handling*

9.1 Grab samples are collected in glass containers having a total volume greater than 20 mL. Fill sample bottles so that no air bubbles pass through the sample as the bottle is filled. Seal each bottle so that no air bubbles are entrapped. Maintain the hermetic seal on the sample bottle until time of analysis.

9.2 Samples are maintained at 0-4 °C from the time of collection until analysis. If the sample contains residual chlorine, add sodium thiosulfate preservative (10 mg/40 mL) to the empty sample bottles just prior to shipment to the sample site. EPA Methods 330.4 and 330.5 may be used for measurement of residual chlorine (Reference 8). If preservative has been added, shake bottle vigorously for one minute immediately after filling.

9.3 Experimental evidence indicates that some aromatic compounds, notably benzene, toluene, and ethyl benzene are susceptible to rapid biological degradation under certain environmental conditions. Refrigeration alone may not be adequate to preserve these compounds in wastewaters for more than seven days. For this reason, a separate sample should be collected, acidified, and analyzed when these aromatics are to be determined. Collect about 500 mL of sample in a clean container.

Adjust the pH of the sample to about 2 by adding HCl (1+1) while stirring. Check pH with narrow range (1.4 to 2.8) pH paper. Fill a sample container as described in Section 9.1. If residual chlorine is present, add sodium thiosulfate to a separate sample container and fill as in Section 9.1.

9.4 All samples shall be analyzed within 14 days of collection.

10. *Purge, Trap, and GC/MS Analysis*

10.1 Remove standards and samples from cold storage and bring to 20-25 °.

10.2 Adjust the purge gas flow rate to 40 ±4 mL/min. Attach the trap inlet to the purging device and set the valve to the purge mode (figure 3). Open the syringe valve located on the purging device sample introduction needle (figure 1).

10.3 Remove the plunger from a 5-mL syringe and attach a closed syringe valve. Open the sample bottle and carefully pour the sample into the syringe barrel until it overflows. Replace the plunger and compress the sample. Open the syringe valve and vent any residual air while adjusting the sample volume to 5.0 mL. Because this process of taking an aliquot destroys the validity of the sample for future analysis, fill a second syringe at this time to protect against possible loss of data. Add an appropriate amount of the labeled compound spiking solution (Section 6.6) through the valve bore, then close the valve.

10.4 Attach the syringe valve assembly to the syringe valve on the purging device. Open both syringe valves and inject the sample into the purging chamber.

10.5 Close both valves and purge the sample for 11.0 ± 0.1 minutes at 20-25 °C.

10.6 After the 11 minute purge time, attach the trap to the chromatograph and set the purge and trap apparatus to the desorb mode (figure 4). Desorb the trapped compounds into the GC column by heating the trap to 170-180 °C while backflushing with carrier gas at 20-60 mL/min for four minutes. Start MS data acquisition upon start of the desorb cycle, and start the GC column temperature program 3 minutes later. Table 1 summarizes the recommended operating conditions for the gas chromatograph. Included in this table are retention times and detection limits that were achieved under these conditions. Other columns may be used provided the requirements in Section 8 can be met. If the priority pollutant gases produce GC peaks so broad that the precision and recovery specifications (Section 8.2) cannot be met, the column may be cooled to ambient or subambient temperatures to sharpen these peaks.

10.7 While analysis of the desorbed compounds proceeds, empty the purging chamber using the sample introduction syringe. Wash the chamber with two 5-mL portions of reagent water. After the purging device has been emptied, allow the purge gas to vent through the chamber until the frit is dry, so that it is ready for the next sample.

10.8 After desorbing the sample for four minutes, recondition the trap by returning to the purge mode. Wait 15 seconds, then close the syringe valve on the purging device to begin gas flow through the trap. Maintain the trap temperature at 170-180 °C. After approximately seven minutes, turn off the trap heater and open the syringe valve to stop the gas flow through the trap. When cool, the trap is ready for the next sample.

11. *System Performance*

11.1 At the beginning of each 8 hr shift during which analyses are performed, system calibration and performance shall be verified for all pollutants and labeled compounds. For these tests, analysis of the aqueous performance standard (Section 6.7.2) shall be used to verify all performance criteria. Adjustment and/or recalibration (per Section 7) shall be performed until all performance criteria are met. Only after all performance criteria are met may blanks and samples be analyzed.

11.2 BFB spectrum validity—the criteria in table 3 shall be met.

11.3 Retention times—the absolute retention times of all compounds shall approximate those given in Table 2.

11.4 GC resolution—the valley height between toluene and toluene-d8 (at m/z 91 and 99 plotted on the same graph) shall be less than 10 percent of the taller of the two peaks.

11.5 Calibration verification and on-going precision and accuracy—compute the concentration of each polutant (Table 1) by isotope dilution (Section 7.4) for those compmunds which have labeled analogs. Compute the concentration of each pollutant (Table 1) which has no labeled analog by the internal standard method (Section 7.5). Compute the concentration of the labeled compounds by the internal standard method. These concentrations are computed based on the calibration data determined in Section 7.

11.5.1 For each pollutant and labeled compound, compare the concentration with the corresponding limit for on-going accuracy in Table 5. If all compmunds meet the acceptance criteria, system performance is acceptable and analysis of blanks and samples may continue. If any individual value falls outside the range given, system performance is unacceptable for that compound.

NOTE: The large number of compounds in Table 5 present a substantial probability that one or more will fail the acceptance criteria when all compounds are analyzed. To determine if the analytical system is out of control, or if the failure may be attributed to probability, proceed as follows:

11.5.1.1 Analyze a second aliquot of the aqueous performance standard (Section 6.7.2).

11.5.1.2 Compute the concentration for only those compounds which failed the first test (Section 11.5.1). If these compounds now pass, system performance is acceptable for all compounds and analyses of blanks and samples may proceed. If, however, any of the compounds fail again, the measurement system is not performing properly for these compounds. In this event, locate and correct the problem or recalibrate the system (Section 7), and repeat the entire test (Section 11.1) for all compounds.

11.5.2 Add results which pass the specification in 11.5.1.2 to initial (Section 8.2) and previous on-going data. Update QC charts to form a graphic representation of laboratory performance (Figure 7). Develop a statement of accuracy for each pollutant and labeled compound by calculating the average percentage recovery (R) and the standard deviation of percent recovery (s_r). Express the accuracy as a recovery interval from $R-2s_r$ to $R+2s_r$. For example, if $R=95\%$ and $s_r=5\%$, the accuracy is 85-105 percent.

12. Qualitative Determination—Accomplished by Comparison of Data from Analysis of a Sample or Blank with Data from Analysis of the Shift Standard (Section 11.1). Identification is Confirmed When Spectra and Retention Times Agree Per the Criteria Below

12.1 Labeled compounds and pollutants having no labeled analog:

12.1.1 The signals for all characteristic masses stored in the spectral library (Section 7.2.4) shall be present and shall maximize within the same two consecutive scans.

12.1.2 Either (1) the background corrected EICP areas, or (2) the corrected relative intensities of the mass spectral peaks at the GC peak maximum shall agree within a factor of two (0.5 to 2 times) for all masses stored in the library.

12.1.3 The retention time relative to the nearest eluted internal standard shall be within ±7 scans or ±20 seconds, whichever is greater.

12.2 Pollutants having a labeled analog:

12.2.1 The signals for all characteristic masses stored in the spectral library (Section 7.2.4) shall be present and shall maximize within the same two consecutive scans.

12.2.2 Either (1) the background corrected EICP areas, or (2) the corrected relative intensities of the mass spectral peaks at the GC peak maximum shall agree within a factor of two for all masses stored in the spectral library.

12.2.3 The retention time difference between the pollutant and its labeled analog shall agree within ±2 scans or ±6 seconds (whichever is greater) of this difference in the shift standard (Section 11.1).

12.3 Masses present in the experimental mass spectrum that are not present in the reference mass spectrum shall be accounted for by contaminant or background ions. If the experimental mass spectrum is contaminated, an experienced spectrometrist (Section 1.4) is to determine the presence or absence of the compound.

13. Quantitative Determination

13.1 Isotope dilution—by adding a known amount of a labeled compound to every sample prior to purging, correction for recovery of the pollutant can be made because the pollutant and its labeled analog exhibit the same effects upon purging, desorption, and gas chromatography. Relative response (RR) values for sample mixtures are used in conjunction with calibration curves described in Section 7.4 to determine concentrations directly, so long as labeled compound spiking levels are constant. For the toluene example given in Figure 6 (Section 7.4.3), RR would be equal to 1.174. For this RR value, the toluene calibration curve given in Figure 5 indicates a concentration of 31.8 μg/L.

13.2 Internal standard—calculate the concentration using the response factor determined from calibration data (Section 7.5) and the following equation:

Concentration $=(A_s \times C_{is})/(A_{is} \times RF)$ where the terms are as defined in Section 7.5.1.

13.3 If the EICP area at the quantitation mass for any compound exceeds the calibration range of the system, the sample is diluted by successive factors of 10 and these dilutions are analyzed until the area is within the calibration range.

13.4 Report results for all pollutants and labeled compounds (Table 1) found in all standards, blanks, and samples, in μg/L to three significant figures. Results for samples which have been diluted are reported at the least dilute level at which the area at the quantitation mass is within the calibration range (Section 13.3) and the labeled compound recovery is within the normal range for the Method (Section 14.2).

14. Analysis of Complex Samples

14.1 Untreated effluents and other samples frequently contain high levels (>1000 μg/L) of the compounds of interest and of interfering compounds. Some samples will foam excessively when purged; others will overload the trap/or GC column.

14.2 Dilute 0.5 mL of sample with 4.5 mL of reagent water and analyze this diluted sample when labeled compound recovery is outside the range given in Table 5. If the recovery remains outside of the range for this diluted sample, the aqueous performance standard shall be analyzed (Section 11) and calibration verified (Section 11.5). If the recovery for the labeled compmund in the aqueous performance standard is outside the range given in Table 5, the analytical system is out of control. In this case, the instrumeit shall be repaired, the performance specifications in Section 11 shall be met, and the analysis of the undiluted sample shall be repeated. If the recovery for the aqueous performance standard is within the range given in Table 5, the method does not work on the sample being analyzed and the result may not be reported for regulatory compliance purposes.

14.3 Reverse search computer programs can misinterpret the spectrum of chromatographically unresolved pollutant and labeled compound pairs with overlapping spectra when a high level of the pollutant is present. Examine each chromatogram for peaks greater than the height of the internal standard peaks. These peaks can obscure the compounds of interest.

15. Method Performance

15.1 The specifications for this method were taken from the inter-laboratory validation of EPA Method 624 (reference 9). Method 1624 has been shown to yield slightly better performance on treated effluents than Method 624. Additional method performance data can be found in Reference 10.

References

1. "Performance Tests for the Evaluation of Computerized Gas Chromatography/Mass Spectrometry Equipment and Laboratories," USEPA, EMSL/Cincinnati, OH 45268, EPA-600/4-80-025 (April 1980).

2. Bellar, T.A. and Lichtenberg, J.J., "Journal American Water Works Association," *66*, 739 (1974).

3. Bellar, T.A. and Lichtenberg, J.J., "Semi-automated Headspace Analysis of Drinking Waters and Industrial Waters for Purgeable Volatile Organic Compounds," in *Measurement of Organic Pollutants Water and Wastewater*, C.E. VanHall, ed., American Society for Testing Materials, Philadelphia, PA, Special Technical Publication 686, (1978).

4. "Working with Carcinogens," DHEW, PHS, NIOSH, Publication 77-206 (1977).

5. "OSHA Safety and Health Standards, General Industry," 29 CFR Part 1910, OSHA 2206, (1976).

6. "Safety in Academic Chemistry Laboratories," American Chemical Society Publication, Committee on Chemical Safety (1979).

7. "Handbook of Analytical Quality Control in Water and Wastewater Laboratories," USEPA, EMSL/Cincinnati, OH 45268, EPA-4-79-019 (March 1979).

8. "Methods 330.4 and 330.5 for Total Residual Chlorine," USEPA, EMSL/Cincinnati, OH 45268, EPA-4-79-020 (March 1979).

9. "EPA Method Study 29 EPA Method 624—Purgeables," EPA 600/4-84-054, National Technical Information Service, PB84-209915, Springfield, Virginia 22161, June 1984.

10. "Colby, B.N., Beimer, R.G., Rushneck, D.R., and Telliard, W.A., "Isotope Dilution Gas Chromatography-Mass Spectrometry for the Determination of Priority Pollutants in Industrial Effluents," USEPA, Effluent Guidelines Division, Washington, DC 20460 (1980).

TABLE 1.—VOLATILE ORGANIC COMPOUNDS ANALYZED BY ISOTOPE DILUTION GC/MS

Compound	Storet	CAS registry	EPA-EGD	NPDES
Acetone	81552	67–64–1	516 V	
Acrolein	34210	107–02–8	002 V	001 V
Acrylonitrile	34215	107–13–1	003 V	002 V
Benzene	34030	71–43–2	004 V	003 V
Bromodichloromethane	32101	75–27–4	048 V	012 V
Bromoform	32104	75–25–2	047 V	005 V
Bromomethane	34413	74–83–9	046 V	020 V
Carbon tetrachloride	32102	56–23–5	006 V	006 V
Chlorobenzene	34301	108–90–7	007 V	007 V
Chloroethane	34311	75–00–3	016 V	009 V
2-chloroethylvinyl ether	34576	110–75–8	019 V	010 V
Chloroform	32106	67–66–1	023 V	011 V
Chloromethane	34418	74–87–3	045 V	021 V
Dibromochloromethane	32105	124–48–1	051 V	008 V
1,1-dichloroethane	34496	75–34–3	013 V	014 V
1,2-dichloroethane	34536	107–06–2	010 V	015 V
1,1-dichloroethene	34501	75–35–4	029 V	016 V
Trans-1,2-dichloroethane	34546	156–60–5	030 V	026 V
1,2-dichloropropene	34541	78–87–5	032 V	017 V
Cis-1,3-dichloropropene	34704	10061–01–5		
Trans-1,3-dichloropropene	34699	10061–02–6	033 V	
Diethyl ether	81576	60–29–7	515 V	
P-dioxane	81582	123–91–1	527 V	
Ethylbenzene	34371	100–41–4	038 V	019 V
Methylene chloride	34423	75–09–2	044 V	022 V
Methyl ethyl ketone	81595	78–93–3	514 V	
1,1,2,2-tetrachloroethane	34516	79–34–5	015 V	023 V
Tetrachlorethene	34475	127–18–4	085 V	024 V
Toluene	34010	108–88–3	086 V	025 V
1,1,1-trichloroethane	34506	71–55–6	011 V	027 V
,1,2-trichloroethane	34511	79–00–5	014 V	028 V
Trichloroethene	39180	79–01–6	087 V	029 V
Vinyl chloride	39175	75–01–4	088 V	031 V

TABLE 2.—GAS CHROMATOGRAPHY OF PURGEABLE ORGANIC COMPOUNDS BY ISOTOPE DILUTION GC/MS

EGD No. (1)	Compound	Ref EGD No.	Mean retention time (sec)	Minimum level (2) (µg/L)
181	Bromochloromethane (I.S.)	181	730	10
245	Chloromethane-d3	181	147	50
345	Chloromethane	245	148	50
246	Bromomethane-d3	181	243	50
346	Bromomethane	246	246	50
288	Vinyl chloride-d3	181	301	50
88	Vinyl chloride	288	304	10
216	Chloroethane-d5	181	378	50
16	Chloroethane	216	386	50
244	Methylene chloride-d2	181	512	10
44	Methylene chloride	244	517	10
16	Acetone-d6	181	554	50
16	Acetone	616	565	50
02	Acrolein	181	566	50
03	Acrylonitrile-d3	181	606	50
03	Acrylonitrile	203	612	50
29	1,1-dichloroethene-d2	181	696	10
29	1,1-dichloroethene	229	696	10
13	1,1-dichloroethane-d3	181	778	10
13	1,1-dichloroethane	213	786	10
15	Diethyl ether-d10	181	804	50
15	Diethyl ether	615	820	50

TABLE 2.—GAS CHROMATOGRAPHY OF PURGEABLE ORGANIC COMPOUNDS BY ISOTOPE DILUTION GC/MS—Continued

EGD No. (1)	Compound	Ref EGD No.	Mean retention time (sec)	Minimum level (2) (µg/L)
230	Trans-1,2-dichloroethene-d2	181	821	10
330	Trans-1,2-dichloroethene	230	821	10
614	Methyl ethyl ketone-d3	181	840	50
714	Methyl ethyl ketone	614	848	50
223	Chloroform-13C1	181	861	10
323	Chloroform	223	861	10
210	1,2-dichloroethane-d4	181	901	10
310	1,2-dichloroethane	210	910	10
211	1,1,1-trichloroethane-13C2	181	989	10
311	1,1,1-trichloroethane	211	999	10
527	p-dioxane	181	1001	10
206	Carbon tetrachloride-13C1	182	1018	10
306	Carbon tetrachloride	206	1018	10
248	Bromodichloromethane-13C1	182	1045	10
348	Bromodichloromethane	248	1045	10
232	1,2-dichloropropane-d6	182	1123	10
332	1.2-dichloropropene	232	1134	10
233	Trans-1,3-dichloropropene-d4	182	1138	10
333	Trans-1,3-dichloropropene	233	1138	10
287	Trichloroethene-13C1	182	1172	10
387	Trichloroethene	287	1187	10
204	Benzene-d6	182	1200	10

TABLE 2.—GAS CHROMATOGRAPHY OF PURGEABLE ORGANIC COMPOUNDS BY ISOTOPE DILUTION GC/MS—Continued

EGD No. (1)	Compound	Ref EGD No.	Mean retention time (sec)	Minimum level (2) (µg/L)
304	Benzene	204	1212	10
251	Chlorodibromemethane-13C1	182	1222	10
351	Chlorodibromomethane	251	1222	10
214	1,1,2-trichloroethane-13C2	182	1224	10
314	1,1,2-trichloroethane	214	1224	10
019	2-chloroethylvinyl ether	182	1278	10
182	2-bromo-1-chloropropane (I.S.)	182	1306	10
247	Bromoform-13C1	182	1386	10
347	Bromoform	247	1386	10
215	1,1,2,2-tetrachloroethane-d2	183	1525	10
315	1,1,2,2-tetrachloroethane	215	1525	10
265	Tetrachloroethene-13C2	183	1528	10
365	Tetrachloroethene	265	1528	10
183	1,4-dichlorobutale (int std)	183	1555	10
266	Toluene-d8	183	1603	10
366	Toluene	266	1619	10
207	Chlorobenzene-d5	183	1679	10
307	Chlorobenzene	207	1679	10
238	Ethylbenzene-d10	183	1802	10
338	Ethylbenzene	238	1820	10
185	Bromofluorobenzene	183	1965	10

(1) Reference numbers beginning with 0, 1 or 5 indicate a pollutant quantified by the internal standard method; reference numbers beginning with 2 or 6 indicate a labeled compound quantified by the internal standard method; reference numbers beginning with 3 or 7 indicate a pollutant quantified by isotope dilution.

(2) This is a minimum level at which the analytical system shall give recognizable mass spectra (background corrected) and acceptable calibration points. Column: 2.4m (8 ft) x 2 mm i.d. glass, packed with one percent SP-1000 coated on 60/80 Carbopak B. Carrier gas: helium at 40 mL/min. Temperature program: 3 min at 45 °C, 8 °C per min to 240 °C, hold at 240 °C for 15 minutes.

NOTE: The specifications in this table were developed from data collected from three wastewater laboratories.

TABLE 3.—BFB Mass-Intensity Specifications

Mass	Intensity required
50	15 to 40 percent of mass 95.
75	30 to 60 percent of mass 95.
95	base peak, 100 percent.
96	5 to 9 percent of mass 95.
173	<2 percent of mass 174.
174	>50 percent of mass 95.
175	5 to 9 percent of mass 174
176	95 to 101 percent of mass 174
177	5 to 9 percent of mass 176.

TABLE 4.—VOLATILE ORGANIC COMPOUND CHARACTERISTIC MASSES

Labeled compound	Analog	Primary m/z's
Acetone	d6	58/
Acrolein	d2	56/
Acrylonitrile	d3	53/
Benzene	d6	78/
Bromodichloromethane	13C	83/
Bromoform	13C	173/17
Bromomethale	d3	96/
Carbon tetrachloride	13C	47/
Chlorobenzene	d5	112/11
Chloroethane	d5	64/
2-chloroethylvinyl ether	d7	106/11
Chloroform	13C	85/
Chloromethane	d3	50/
Dibromochloromethane	13C	129/13
1,1-dichloroethane	d3	63/
1,2-dichloroethane	d4	62/
1,1-dichloroethene	d2	61/
Trans-1,2-dichloroethene	d2	61/
1,2-dichloropropane	d6	63/
Cis-1,3-dichloropropene	d4	75/
Trans-1,3-dichloropropene	d4	75/
Diethyl ether	d10	74/
p-dioxane	d8	88/
Ethylbenzene	d10	106/11
Methylene chloride	d2	84/
Methyl ethyl ketone	d3	72/
1,1,2,2-tetrachloroethane	d2	83/
Tetrachloroethene	13C2	166/17
Toluene	d8	92/
1,1,1-trichloroethane	d3	97/10
1,1,2-trichloroethane	13C2	83/
Trichloroethene	13C	95/13
Vinyl chloride	d3	62/

TABLE 5.—ACCEPTANCE CRITERIA FOR PERFORMANCE TESTS

Compound	Acceptance criteria at 20 µg/L			
	Initial precision and accuracy section 8.2.3		Labeled compound recovery sec. 8.3 and 14.2	On-going accuracy sec. 11.5
	s (µg/L)	$\bar{X}$ (µg/L)	P (percent)	R (µg/L)
Acetone		Note 1		
Acrolein		Note 2		
Acrylonitrile		Note 2		
Benzene	9.0	13.0–28.2	ns–196	4-
Bromodichloromethane	8.2	6.5–31.5	ns–199	4-

TABLE 5.—ACCEPTANCE CRITERIA FOR PERFORMANCE TESTS—Continued

Compound	Acceptance criteria at 20 µg/L			
	Initial precision and accuracy section 8.2.3		Labeled compound recovery sec. 8.3 and 14.2	On-going accuracy sec. 11.5
	s (µg/L)	$\bar{X}$ (µg/L)	P (percent)	R (µg/L)
Bromoform	7.0	7.4–35.1	ns–214	6–36
Bromomethane	25.0	d–54.3	ns–414	d–61
Carbon tetrachloride	6.9	15.9–24.8	42–165	12–30
Chlorobenzene	8.2	14.2–29.6	ns–205	4–35
Chloroethane	14.8	2.1–46.7	ns–306	d–51
2-chloroethylvinyl ether	36.0	d–69.8	ns–554	d–79
Chloroform	7.9	11.6–26.3	18–172	8–30
Chloromethane	26.0	d–55.5	ns–410	d–64
Dibromochloromethane	7.9	11.2–29.1	16–185	8–32
,1-dichloroethane	6.7	11.4–31.4	23–191	9–33
,2-dichloroethane	7.7	11.6–30.1	12–192	8–33
,1-dichloroethene	11.7	d–49.8	ns–315	d–52
Trans-1,2-dichloroethene	7.4	10.5–31.5	15–195	8–34
,2-dichloropropane	19.2	d–46.8	ns–343	d–51
Cis-1,3-dichloropropene	22.1	d–51.0	ns–361	d–56
Trans-1,3-dichloropropene	14.5	d–40.2	ns–284	d–44
Diethyl ether		Note 1		
P-dioxane		Note 1		
Ethyl benzene	9.6	15.6–28.5	ns–203	5–35
Methylene chloride	9.7	d–49.8	ns–316	d–50
Methyl ethyl ketone		note 1		
,1,2,2-tetrachloroethane	9.6	10.7–30.0	5–199	7–34
Tetrachloroethene	6.6	15.1–28.5	31–181	11–32
Toluene	6.3	14.5–28.7	4–193	6–33
,1,1-trichloroethane	5.9	10.5–33.4	12–200	8–35
,1,2-trichloroethane	7.1	11.8–29.7	21–184	9–32
Trichloroethene	8.9	16.6–29.5	35–196	12–34
Vinyl chloride	27.9	d–58.5	ns–452	d–65

d=detected; result must be greater than zero.
ns=no specification; limit would be below detection limit.

NOTE 1: Specifications not available for these compounds at time of release of this method.
NOTE 2: Specifications not developed for these compounds; use method 603.

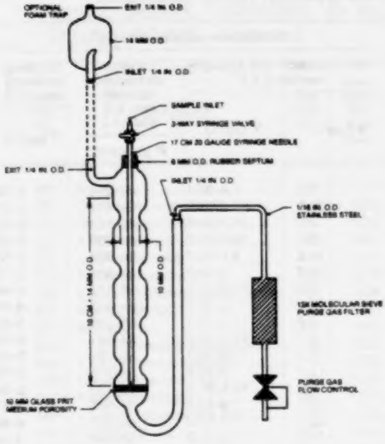

OPTIONAL FOAM TRAP
EXIT 1/4 IN. O.D.
14 MM O.D.
INLET 1/4 IN. O.D.
SAMPLE INLET
2-WAY SYRINGE VALVE
17 CM 20 GAUGE SYRINGE NEEDLE
6 MM O.D. RUBBER SEPTUM
EXIT 1/4 IN. O.D.
INLET 1/4 IN. O.D.
1/16 IN. O.D. STAINLESS STEEL
10 CM × 14 MM O.D.
10 MM O.D.
13X MOLECULAR SIEVE PURGE GAS FILTER
PURGE GAS FLOW CONTROL
10 MM GLASS FRIT MEDIUM POROSITY

FIGURE 1 Purging Device.

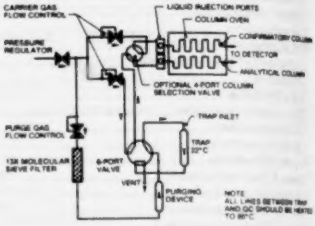

CARRIER GAS FLOW CONTROL
LIQUID INJECTION PORTS
COLUMN OVEN
CONFIRMATORY COLUMN
PRESSURE REGULATOR
TO DETECTOR
ANALYTICAL COLUMN
OPTIONAL 4-PORT COLUMN SELECTION VALVE
TRAP INLET
PURGE GAS FLOW CONTROL
TRAP 22°C
13X MOLECULAR SIEVE FILTER
6-PORT VALVE
VENT
PURGING DEVICE
NOTE
ALL LINES BETWEEN TRAP AND GC SHOULD BE HEATED TO 80°C

FIGURE 3 Schematic of Purge and Trap Device—Purge Mode.

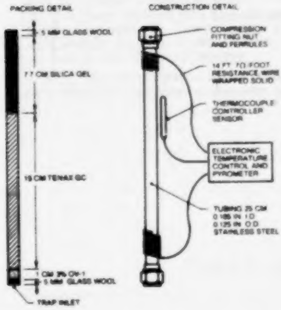

PACKING DETAIL
CONSTRUCTION DETAIL
5 MM GLASS WOOL
7.7 CM SILICA GEL
15 CM TENAX GC
1 CM 3% OV-1
5 MM GLASS WOOL
TRAP INLET
COMPRESSION FITTING NUT AND FERRULES
14 FT. 7Ω/FOOT RESISTANCE WIRE WRAPPED SOLID
THERMOCOUPLE CONTROLLER SENSOR
ELECTRONIC TEMPERATURE CONTROL AND PYROMETER
TUBING 25 CM 0.105 IN. I.D. 0.125 IN. O.D. STAINLESS STEEL

FIGURE 2 Trap Packings and Construction to Include Desorb Capability.

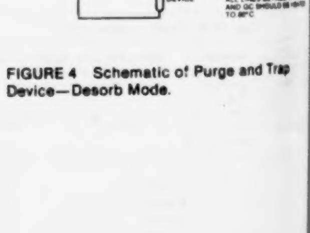

CARRIER GAS FLOW CONTROL
LIQUID INJECTION PORTS
COLUMN OVEN
CONFIRMATORY COLUMN
PRESSURE REGULATOR
TO DETECTOR
ANALYTICAL COLUMN
OPTIONAL 4-PORT COLUMN SELECTION VALVE
TRAP INLET
PURGE GAS FLOW CONTROL
TRAP
13X MOLECULAR SIEVE FILTER
6-PORT VALVE
VENT
PURGING DEVICE
NOTE
ALL LINES BETWEEN TRAP AND GC SHOULD BE HEATED TO 80°C

FIGURE 4 Schematic of Purge and Trap Device—Desorb Mode.

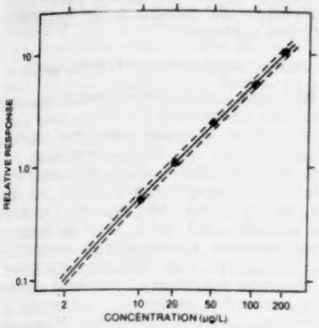


FIGURE 5 Relative Response Calibration Curve for Toluene. The Dotted Lines Enclose a ± 10 Percent Error Window.

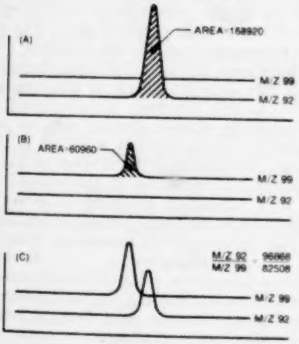


FIGURE 6 Extracted Ion Current Profiles for A) Toluene, (B) Toluene-d_8, and a Mixture of Toluene and Toluene-d_8.

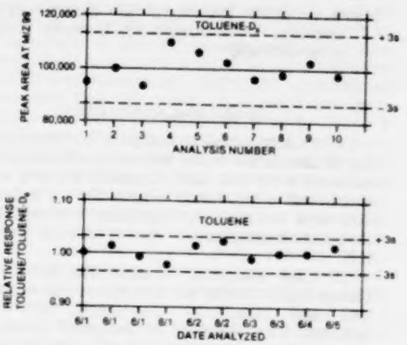


FIGURE 7 Quality Control Charts Showing Area (top graph) and Relative Response of Toluene to Toluene-d_8 (lower graph) Plotted as a Function of Time or Analysis Number.

METHOD 1625 REVISION B—SEMIVOLATILE ORGANIC COMPOUNDS BY ISOTOPE DILUTION GC/MS

1. *Scope and Application*

1.1 This method is designed to determine the semivolatile toxic organic pollutants associated with the 1976 Consent Decree and additional compounds amenable to extraction and analysis by capillary column gas chromatography-mass spectrometry (GC/MS).

1.2 The chemical compounds listed in Tables 1 and 2 may be determined in municipal and industrial discharges by this method. The method is designed to meet the survey requirements of Effluent Guidelines Division (EGD) and the National Pollutants Discharge Elimination System (NPDES) under 40 CFR 136.1. Any modifications of this method, beyond those expressly permitted, shall be considered as major modifications subject to application and approval of alternate test procedures under 40 CFR 136.4 and 136.5.

1.3 The detection limit of this method is usually dependent on the level of interferences rather than instrumental limitations. The limits listed in Tables 3 and 4 represent the minimum quantity that can be detected with no interferences present.

1.4 The GC/MS portions of this method are for use only by analysts experienced with GC/MS or under the close supervision of such qualified persons. Laboratories unfamiliar with analyses of environmental samples by GC/MS should run the performance tests in reference 1 before beginning.

2. *Summary of Method*

2.1 Stable isotopically labeled analogs of the compounds of interest are added to a one liter wastewater sample. The sample is extracted at pH 12-13, then at pH <2 with methylene chloride using continuous extraction techniques. The extract is dried over sodium sulfate and concentrated to a volume of one mL. An internal standard is added to the extract, and the extract is injected into the gas chromatograph (GC). The compounds are separated by GC and detected by a mass spectrometer (MS). The labeled compounds serve to correct the variability of the analytical technique.

2.2 Identification of a compound (qualitative analysis) is performed by comparing the GC retention time and background corrected characteristic spectral masses with those of authentic standards.

2.3 Quantitative analysis is performed by GC/MS using extracted ion current profile (EICP) areas. Isotope dilution is used when labeled compounds are available; otherwise, an internal standard method is used.

2.4 Quality is assured through reproducible calibration and testing of the extraction and GC/MS systems.

3. *Contamination and Interferences*

3.1 Solvents, reagents, glassware, and other sample processing hardware may yield artifacts and/or elevated baselines causing misinterpretation of chromatograms and spectra. All materials shall be demonstrated to be free from interferences under the conditions of analysis by running method blanks initially and with each sample lot (samples started through the extraction process on a given 8 hr shift, to a maximum of 20). Specific selection of reagents and purification of solvents by distillation in all-glass systems may be required. Glassware and, where possible, reagents are cleaned by solvent rinse and baking at 450 °C for one hour minimum.

3.2 Interferences coextracted from samples will vary considerably from source to source, depending on the diversity of the industrial complex or municipality being samples.

4. *Safety*

4.1 The toxicity or carcinogenicity of each compound or reagent used in this method has not been precisely determined; however, each chemical compound should be treated as a potential health hazard. Exposure to these compounds should be reduced to the lowest possible level. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of data handling sheets should also be made available to all personnel involved in these analyses. Additional information on laboratory safety can be found in references 2-4.

4.2 The following compounds covered by this method have been tentatively classified as known or suspected human or mammalian carcinogens: benzidine benzo(a)anthracene, 3,3′-dichlorobenzidine, benzo(a)pyrene, dibenzo(a,h)anthracene, N-nitrosodimethylamine, and β-naphtylamine. Primary standards of these compounds shall be prepared in a hood, and a NIOSH/MESA approved toxic gas respirator should be worn when high concentrations are handled.

5. *Apparatus and Materials*

5.1 Sampling equipment for discrete or composite sampling.

5.1.1 Sample bottle, amber glass, 1.1 liters minimum. If amber bottles are not available, samples shall be protected from light. Bottles are detergent water washed, then solvent rinsed or baked at 450 °C for one hour minimum before use.

5.1.2 Bottle caps—threaded to fit sample bottles. Caps are lined with Teflon. Aluminum foil may be substituted if the sample is not corrosive. Liners are detergent water washed, then reagent water (Section 6.5) and solvent rinsed, and baked at approximately 200 °C for one hour minimum before use.

5.1.3 Compositing equipment—automatic or manual compositing system incorporating glass containers for collection of a minimum 1.1 liters. Sample containers are kept at 0 to 4 °C during sampling. Glass or Teflon tubing only shall be used. If the sampler uses a peristaltic pump, a minimum length of compressible silicone rubber tubing may be used in the pump only. Before use, the tubing is thoroughly rinsed with methanol, followed by repeated rinsings with reagent water (Section 6.5) to minimize sample contamination. An integrating flow meter is used to collect proportional composite samples.

5.2 Continuous liquid-liquid extractor—Teflon or glass conncecting joints and stopcocks without lubrication (Hershberg-Wolf Extractor) one liter capacity, Ace Glass 6841-10, or equivalent.

5.3 Drying column—15 to 20 mm i.d. Pyrex chromatographic column equipped with coarse glass frit or glass wool plug.

5.4 Kuderna-Danish (K-D) apparatus

5.4.1 Concentrator tube—10mL, graduated (Kontes K-570050-1025, or equivalent) with calibration verified. Ground glass stopper (size 19/22 joint) is used to prevent evaporation of extracts.

5.4.2 Evaporation flask—500 mL (Kontes K-570001-0500, or equivalent), attached to concentrator tube with springs (Kontes K-562750-0012).

5.4.3 Snyder column—three ball macro (Kontes K-503000-0232, or equivalent).

5.4.4 Snyder column—two ball micro Kontes K-469002-0219, or equivalent).

5.4.5 Boiling chips—approx 10/40 mesh, xtracted with methylene chloride and aked at 450 °C for one hr minimum.

5.5 Water bath—heated, with concentric ing cover, capable of temperature control ±2 °C, installed in a fume hood.

5.6 Sample vials—amber glass, 2-5 mL with Teflon-lined screw cap.

5.7 Analytical balance—capable of weigh-ng 0.1 mg.

5.8 Gas chromatograph—shall have split-ess or on-column injection port for capil-ary column, temperature program with 30 C hold, and shall meet all of the perform-nce specifications in Section 12.

5.8.1 Column—30±5 m×0.25±0.02 mm d. 5% phenyl, 94% methyl, 1% vinyl sili-one bonded phase fused silica capillary olumn (J & W DB-5, or equivalent).

5.9 Mass spectrometer—70 eV electron mpact ionization, shall repetitively scan om 35 to 450 amu in 0.95 to 1.00 second, and shall produce a unit resolution (valleys between m/z 441-442 less than 10 percent of the height of the 441 peak), backgound corrected mass spectrum from 50 ng decafluorotriphenylphosphine (DFTPP) introduced through the GC inlet. The spectrum shall meet the mass-intensity criteria in Table 5 (reference 5). The mass spectrometer shall be interfaced to the GC such that the end of the capillary column terminates within one centimeter of the ion source but does not intercept the electron or ion beams. All portions of the column which connect the GC to the ion source shall remain at or above the column temperature during analysis to preclude condensation of less volatile compounds.

5.10 Data system—shall collect and record MS data, store mass-intensity data in spectral libraries, process GC/MS data, generate reports, and shall compute and record response factors.

5.10.1 Data acquisition—mass spectra shall be collected continuously throughout the analysis and stored on a mass storage device.

5.10.2 Mass spectral libraries—user created libraries containing mass spectra obtained from analysis of authentic standards shall be employed to reverse search GC/MS runs for the compounds of interest (Section 7.2).

5.10.3 Data processing—the data system shall be used to search, locate, identify, and quantify the compounds of interest in each GC/MS analysis. Software routines shall be employed to compute retention times and peak areas. Displays of spectra, mass chromatograms, and library comparisons are required to verify results.

5.10.4 Response factors and multipoint calibrations—the data system shall be used to record and maintain lists of response factors (response ratios for isotope dilution) and multipoint calibration curves (Section 7). Computations of relative standard deviation (coefficient of variation) are useful for testing calibration linearity. Statistics on initial (Section 8.2) and on-going (Section 12.7) performance shall be computed and maintained.

6. *Reagents and Standards*

6.1 Sodium hydroxide—reagent grade, 6N in reagent water.

6.2 Sulfuric acid—reagent grade, 6N in reagent water.

6.3 Sodium sulfate—reagent grade, granular anhydrous, rinsed with methylene chloride (20 mL/g) and conditioned at 450 °C for one hour minimum.

6.4 Methylene chloride—distilled in glass (Burdick and Jackson, or equivalent).

6.5 Reagent water—water in which the compounds of interest and interfering compounds are not detected by this method.

6.6 Standard solutions—purchased as solutions or mixtures with certification to their purity, concentration, and autheltieity, or prepared from materials of known purity and composition. If compmund purity is 96 percent or greater, the weight may be used without correction to compute the concentration of the standard. When not being used, standards are stored in the dark at −20 to −10 °C in screw-capped vials with Teflon-lined lids. A mark is placed on the vial at the level of the solution so that solvent evaporation loss can be detected. The vials are brought to room temperature prior to use. Any precipitate is redissolved and solvent is added if solvent loss has occurred.

6.7 Preparation of stock solutions—prepare in methylene chloride, benzene, p-dioxane, or a mixture of these solvents per the steps below. Observe the safety precautions in Section 4. The large number of labeled and unlabeled acid, base/neutral, and Appendix C compounds used for combined calibration (Section 7) and calibration verification (12.5) require high concentratimns (approx 40 mg/mL) when individual stock solutions are prepared, so that dilutions of mixtures will permit calibration with all compounds in a single set of solutions. The working range for most compounds is 10-200 µg/mL. Compounds with a reduced MS response may be prepared at higher concentrations.

6.7.1 Dissolve an appropriate amount of assayed reference material in a suitable solvent. For example, weigh 400 mg naphthalene in a 10 mL ground glass stoppered volumetric flask and fill to the mark with benzene. After the naphthalene is completely dissolved, transfer the solution to a 15 mL vial with Teflon-lined cap.

6.7.2 Stock standard solutions should be checked for signs of degradation prior to the preparation of calibration or performance test standards. Quality control check samples that can be used to determine the accuracy of calibration standards are available from the US Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

6.7.3 Stock standard solutions shall be replaced after six months, or sooner if comparison with quality control check samples indicates a change in concentration.

6.8 Labeled compound spiking solution—from stock standard solutions prepared as above, or from mixtures, prepare the spiking solution at a concentration of 200 µg/mL, or at a concentration appropriate to the MS response of each compound.

6.9 Secondary standard—using stock solutions (Section 6.7), prepare a secondary standard containing all of the compounds in Tables 1 and 2 at a concentration of 400 µg/mL, or higher concentration appropriate to the MS response of the compound.

6.10 Internal standard solution—prepare 2,2′-difluorobiphenyl (DFB) at a concentration of 10 mg/mL in benzene.

6.11 DFTPP solution—prepare at 50 µg/mL in acetone.

6.12 Solutions for obtaining authentic mass spectra (Section 7.2)—prepare mixtures of compounds at concentrations which will assure authentic spectra are obtained for storage in libraries.

6.13 Calibration solutions—combine 0.5 mL of the solution in Section 6.8 with 25, 50, 125, 250, and 500 uL of the solution in section 6.9 and bring to 1.00 mL total volume each. This will produce calibration solutions of nominal 10, 20, 50, 100, and 200 µg/mL of the pollutants and a constant nominal 100 µg/mL of the labeled compounds. Spike each solution with 10 µL of the internal standard solution (Section 6.10). These solutions permit the relative response (labeled to unlabeled) to be measured as a function of concentration (Section 7.4).

6.14 Precision and recovery standard—used for determination of initial (Section 8.2) and on-going (Section 12.7) precision and recovery. This solution shall contain the pollutants and labeled compounds at a nominal concentration of 100 µg/mL.

6.15 Stability of solutions—all standard solutions (Sections 6.8–6.14) shall be analyzed within 48 hours of preparation and on a monthly basis thereafter for signs of degradation. Standards will remain acceptable if the peak area at the quantitation mass relative to the DFB internal standard remains within ±15 percent of the area obtained in the initial analysis of the standard.

7. *Calibration*

7.1 Assemble the GC/MS and establish the operating conditions in Table 3. Analyze standards per the procedure in Section 11 to demonstrate that the analytical system meets the detection limits in Tables 3 and 4, and the mass-intensity criteria in Table 5 for 50 ng DFTPP.

7.2 Mass spectral libraries—detection and identification of compounds of interest are dependent upon spectra stored in user created libraries.

7.2.1 Obtain a mass spectrum of each pollutant, labeled compound, and the internal standard by analyzing an authentic standard either singly or as part of a mixture in which there is no interference between closely eluted components. That only a single compound is present is determined by examination of the spectrum. Fragments not attributable to the compound under study indicate the presence of an interfering compound.

7.2.2 Adjust the analytical conditions and scan rate (for this test only) to produce an undistorted spectrum at the GC peak maxi-

mum. An undistorted spectrum will usually be obtained if five complete spectra are collected across the upper half of the GC peak. Software algorithms designed to "enhance" the spectrum may eliminate distortion, but may also eliminate authentic masses or introduce other distortion.

7.2.3 The authentic reference spectrum is obtained under DFTPP tuning conditions (Section 7.1 and Table 5) to normalize it to spectra from other instruments.

7.2.4 The spectrum is edited by saving the 5 most intense mass spectral peaks and all other mass spectral peaks greater than 10 percent of the base peak. This edited spectrum is stored for reverse search and for compound confirmation.

7.3 Analytical range—demonstrate that 20 ng anthracene or phenanthrene produces an area at m/z 178 approx one-tenth that required to exceed the linear range of the system. The exact value must be determined by experience for each instrument. It is used to match the calibration range of the instrument to the analytical range and detection limits required, and to diagnose instrument sensitivity problems (Section 15.4). The 20 ug/mL calibration standard (Section 6.13) can be used to demonstrate this performance.

7.3.1 Polar compound detection—demonstrate that unlabeled pentachlorophenol and benzidine are detectable at the 50 μg/mL level (per all criteria in Section 13). The 50 μg/mL calibration standard (Section 6.13) can be used to demonstrate this performance.

7.4 Calibration with isotope dilution—isotope dilution is used when (1) labeled compounds are available, (2) interferences do not preclude its use, and (3) the quantitation mass extracted ion current profile (EICP) area for the compound is in the calibration range. If any of these conditions preclude isotope dilution, internal standard methods (Section 7.5 or 7.6) are used.

7.4.1 A calibration curve encompassing the concentration range is prepared for each compound to be determined. The relative response (pollutant to labeled) vs concentration in standard solutions is plotted or computed using a linear regression. The example in Figure 1 shows a calibration curve for phenol using phenol-d5 as the isotopic diluent. Also shown are the ± 10 percent error limits (dotted lines). Relative Response (RR) is determined according to the procedures described below. A minimum of five data points are employed for calibration.

7.4.2 The relative response of a pollutant to its labeled analog is determined from isotope ratio values computed from acquired data. Three isotope ratios are used in this process:

R_x = the isotope ratio measured for the pure pollutant.

R_y = the isotope ratio measured for the labeled compound.

R_m = the isotope ratio of an analytical mixture of pollutant and labeled compounds.

The m/z's are selected such that $R_x > R_y$. If R_m is not between $2R_y$ and $0.5R_x$, the method does not apply and the sample is analyzed by internal or external standard methods.

7.4.3 Capillary columns usually separate the pollutant-labeled pair, with the labeled compound eluted first (Figure 2). For this case, R_x = [area m_1/z]/1, at the retention time of the pollutant (RT_2). R_y = 1/[area m_2/z, at the retention time of the labeled compound RT_1). R_m = [area at m_1/z (at RT_2)]/[area at RT_1)], as measured in the mixture of the pollutant and labeled compounds (Figure 2), and RR = R_m.

7.4.4 Special precautions are taken when the pollutant-labeled pair is not separated, or when another labeled compound with interfering spectral masses overlaps the pollutant (a case which can occur with isomeric compounds). In this case, it is necessary to determine the respective contributions of the pollutant and labeled compounds to the respective EICP areas. If the peaks are separated well enough to permit the data system or operator to remove the contributions of the compounds to each other, the equations in Section 7.4.3 apply. This usually occurs when the height of the valley between the two GC peaks at the same m/z is less than 10 percent of the height of the shorter of the two peaks. If significant GC and spectral overlap occur, RR is computed using the following equation:

$RR = (R_y - R_m)(R_x + 1)/(R_m - R_x)(R_y + 1)$, where R_x is measured as shown in Figure 3A, R_y is measured as shown in Figure 3B, and R_m is measured as shown in Figure 3C. For example, $R_x = 46100/4780 = 9.644$, $R_y = 2650/43600 = 0.0608$, $R_m = 49200/48300 = 1.019$. amd RR = 1.114.

7.4.5 To calibrate the analytical system by isotope dilution, analyze a 1.0 μL aliquot of each of the calibration standards (Section 6.13) using the procedure in Section 11. Compute the RR at each concentration.

7.4.6 Linearity—if the ratio of relative response to concentration for any compound is constant (less than 20 percent coefficient of variation) over the 5 point calibration range, and averaged relative response/concentration ratio may be used for that compound; otherwise, the complete calibration curve for that compound shall be used over the 5 point calibration range.

7.5 Calibration by internal standard—used when criteria for istope dilution (Section 7.4) cannot be met. The internal standard to be used for both acid and base/neutral analyses is 2,2'-difluorobiphenyl. The internal standard method is also applied to determination of compounds having no labeled analog, and to measurement of labeled compounds for intra-laboratory statistics (Sections 8.4 and 12.7.4).

7.5.1 Response factors—calibration requires the determination of response factors (RF) which are defined by the following equation:

$RF = (A_s \times C_{is})/(A_{is} \times C_s)$, where

A_s is the area of the characteristic mass for the compmund in the daily standard

A_{is} is the area of the characteristic mass for the internal standard

C_{is} is the concentration of the internal standard (μg/mL)

C_s is the concentration of the compound in the daily standard (μg/mL)

7.5.1.1 The response factor is determined for at least five concentrations appropriate to the response of each compound (Section 6.13); nominally, 10, 20, 50, 100, and 200 μg/mL. The amount of internal standard added to each extract is the same (100 μg/mL) so that C_{is} remains constant. The RF is plotted vs concentration for each compound in the standard (C_s) to produce a calibration curve.

7.5.1.2 Linearity—if the response factor (RF) for any compound is constant (less than 35 percent coefficient of variation) over the 5 point calibration range, an averaged response factor may be used for that compound; otherwise, the complete calibration curve for that compound shall be used over the 5 point range.

7.6 Combined calibration—by using calibration solutions (Section 6.13) containing the pollutants, labeled compounds, and the internal standard, a single set of analyses can be used to produce calibration curves for the isotope dilution and internal standard methods. These curves are verified each shift (Section 12.5) by analyzing the 100 θg/mL calibration standard (Section 6.13). Recalibration is required only if calibration verification (Section 12.5) criteria cannot be met.

8. *Quality Assurance/Quality Control*

8.1 Each laboratory that uses this method is required to operate a formal quality assurance program. The minimum requirements of this program consist of an initial demonstration of laboratory capability, analysis of samples spiked with labeled compounds to evaluate and document data quality, and analysis of standards and blanks as tests of continued performance. Laboratory performance is compared to established performance criteria to determine if the results of analyses meet the performance characteristics of the method.

8.1.1 The analyst shall make an initial demonstration of the ability to generate acceptable accuracy and precision with this method. This ability is established as described in Section 8.2.

8.1.2 The analyst is permitted to modify this method to improve separations or lower the costs of measurements, provided all performance specifications are met. Each time a modification is made to the method, the analyst is required to repeat the procedure in Section 8.2 to demonstrate method performance.

8.1.3 Analyses of blanks are required to demonstrate freedom from contamination. The procedures and criteria for analysis of a blank are described in Section 8.5.

8.1.4 The laboratory shall spike all samples with labeled compounds to monitor method performance. This test is described in Section 8.3. When results of these spikes indicate atypical method performance for samples, the samples are diluted to bring method performance within acceptable limits (Section 15).

8.1.5 The laboratory shall, on an ongoing basis, demonstrate through calibration verification and the analysis of the precision and recovery standard (Section 6.14) that the analysis system is in control. These procedures are described in Sections 12.1, 12.5, and 12.7.

8.1.6 The laboratory shall maintain records to define the quality of data that is generated. Development of accuracy statements is described in Section 8.4.

8.2 Initial precision and accuracy—to establish the ability to generate acceptable precision and accuracy, the analyst shall perform the following operations:

8.2.1 Extract, concentrate, and analyze two sets of four one-liter aliquots (8 aliquots total) of the precision and recovery standard (Section 6.14) according to the procedure in Section 10.

8.2.2 Using results of the first set of four analyses, compute the average recovery ($\bar{X}$) in μg/mL and the standard deviation of the recovery (s) in θg/μL for each compound, by isotope dilution for pollutants with a labeled analog, and by internal standard for labeled compounds and pollutants with no labeled analog.

8.2.3 For each compound, compare s and $\bar{X}$ with the corresponding limits for initial precision and accuracy in Table 8. If s and $\bar{X}$ for all compounds meet the acceptance criteria, system performance is acceptable and analysis of blanks and samples may begin. If, however, any individual s exceeds the precision limit or any individual $\bar{X}$ falls outside the range for accuracy, system performance is unacceptable for that compound.

NOTE: The large number of compounds in Table 8 present a substantial probability that one or more will fail the acceptance criteria when all compounds are analyzed. To determine if the analytical system is out of control, or if the failure can be attributed to probability, proceed as follows:

8.2.4 Using the results of the second set of four analyses, compute s and $\bar{X}$ for only those compounds which failed the test of the first set of four analyses (Section 8.2.3). If these compounds now pass, system performance is acceptable for all compounds and analysis of blanks and samples may begin. If, however, any of the same compoulds fail again, the analysis system is not performing properly for these compounds. In this event, correct the problem and repeat the entire test (Section 8.2.1).

8.3 The laboratory shall spike all samples with labeled compounds to assess method performance on the sample matrix.

8.3.1 Analyze each sample according to the method in Section 10.

8.3.2 Compute the percent recovery (P) of the labeled compounds using the internal standard methmd (Section 7.5).

8.3.3 Compare the labeled compound recovery for each compound with the corresponding limits in Table 8. If the recovery of any compounds falls outside its warning limit, method performance is unacceptable for that compound in that sample. Therefore, the sample is complex and is to be diluted and reanalyzed per Section 15.4.

8.4 As part of the QA program for the laboratory, method accuracy for wastewater samples shall be assessed and records shall be maintained. After the analysis of five wastewater samples for which the labeled compounds pass the tests in Section 8.3, compute the average percent recovery (P) and the standard deviation of the percent recovery (s_p) for the labeled compounds only. Express the accuracy assessment as a percent recovery interval from P—2$_{s_p}$ to P+2$_{s_p}$. For example, if P=90% and s_p=10%, the accuracy interval is expressed as 70-100%. Update the accuracy assessment for each compound on a regular basis (e.g. after each 5-10 new accuracy measurements).

8.5 Blanks—reagent water blanks are analyzed to demonstrate freedom from contamination.

8.5.1 Extract and concentrate a blank with each sample lot (samples started through the extraction process on the same 8 hr shift, to a maximum of 20 samples). Analyze the blank immediately after analysis of the precision and recovery standard (Section 6.14) to demonstrate freedom from contamination.

8.5.2 If any of the compounds of interest (Tables 1 and 2) or any potentially interfering compound is found in a blank at greater than 10 μg/L (assuming a response factor of 1 relative to the internal standard for compounds not listed in Tables 1 and 2), analysis of samples is halted until the source of contamination is eliminated and a blank shows no evidence of contamination at this level.

8.6 The specifications contained in this method can be met if the apparatus used is calibrated properly, then maintained in a calibrated state. The standards used for calibration (Section 7), calibration verification (Section 12.5), and for initial (Section 8.2) and on-going (Section 12.7) precision and recovery should be identical, so that the most precise results will be obtained. The GC/MS instrument in particular will provide the most reproducible results if dedicated to the settings and conditions required for the analysis of semi-volatiles by this method.

8.7 Depending on specific program requirements, field replicates may be collected to determine the precision of the sampling technique, and spiked samples may be required to determine the accuracy of the analysis when internal or external standard methods are used.

9. *Sample Collection, Preservation, and Handling*

9.1 Collect samples in glass containers following conventional sampling practices (Reference 7). Composite samples are collected in refrigerated glass containers (Section 5.1.3) in accordance with the requirements of the sampling program.

9.2 Maintain samples at 0-4 °C from the time collectimn until extraction. If residual chlorine is present, add 80 mg sodium thiosulfate per liter of water. EPA Methods 330.4 and 330.5 may be used to measure residual chlorine (Reference 8).

9.3 Begin sample extraction within seven days of collection, and analyze all extracts within 40 days of extraction.

10. *Sample Extraction and Concentration (See Figure 4)*

10.1 Labeled compound spiking—measure 1.00 ± 0.01 liter of sample into a glass container. For untreated effluents, and samples which are expected to be difficult to extract and/or concentrate, measure an additional 10.0 ± 0.1 mL and dilute to a final volume of 1.00 ± 0.01 liter with reagent water in a glass container.

10.1.1 For each sample or sample lot (to a maximum of 20) to be extracted at the same time, place three 1.00 ± 0.10 liter aliquots of reagent water in glass containers.

10.1.2 Spike 0.5 mL of the labeled compound spiking solution (Section 6.8) into all samples and one reagant water aliquot.

10.1.3 Spike 1.0 mL of the precision and recovery standard (Section 6.14) into the two remaining reagent water aliquots.

10.1.4 Stir and equilibrate all solutions for 1-2 hr.

10.2 Base/neutral extraction—place 100-150 mL methylene chloride in each continuous extractor and 200-300 in each distilling flask.

10.2.1 Pour the sample(s), blank, and standard aliquots into the extractors. Rinse the glass containers with 50-100 mL methylene chloride and add to the respective extractor.

10.2.2 Adjust the pH of the waters in the extractors to 12-13 with 6N NaOH while monitoring with a pH meter. Begin the extraction by heating the flask until the methylene chloride is boiling. When properly adjusted, 1-2 drops of methylene chloride per second will fall from the condensor tip into the water. After 1-2 hours of extraction, test the pH and readjust to 12-13 if required. Extract for 18-24 hours.

10.2.3 Remove the distilling flask, estimate and record the volume of extract (to the nearest 100 mL), and pour the contents through a drying column containing 7 to 10 cm anhydrous sodium sulfate. Rinse the distilling flask with 30-50 mL of methylene chloride and pour through the drying column. Collect the solution in a 500 mL K-D evaporator flask equipped with a 10 mL concentrator tube. Seal, label as the base/neutral fraction, and concentrate per Sections 10.4 to 10.5.

10.3 Acid extraction—adjust the pH of the waters in the extractors to 2 or less using 6N sulfuric acid. Charge clean distilling flasks with 300-400 mL of methylene chloride. Test and adjust the pH of the waters after the first 1-2 hr of extraction. Extract for 18-24 hours.

10.3.1 Repeat Section 10.2.3, except label as the acid fraction.

10.4 Concentration—concentrate the extracts in separate 500 mL K-D flasks equipped with 10 mL concentrator tubes.

10.4.1 Add 1 to 2 clean boiling chips to the flask and attach a three-ball macro Snyder column. Prewet the column by adding approximately one mL of methylene chloride through the top. Place the K-D apparatus in a hot water bath so that the entire lower rounded surface of the flask is bathed with steam. Adjust the vertical position of the apparatus and the water temperature as required to complete the concentration in 15 to 20 minutes. At the proper rate of distillation, the balls of the column will actively chatter but the chambers will not flood. When the liquid has reached an apparent volume of 1 mL, remove the K-D apparatus from the bath and allow the solvent to drain and cool for at least 10 minutes. Remove the Snyder column and rinse the flask and its lower joint into the concentrator tube with 1-2 mL of methylene chloride. A 5-mL syringe is recommended for this operation.

10.4.2 For performance standards (Sections 8.2 and 12.7) and for blanks (Section 8.5), combine the acid and base/neutral extracts for each at this point. Do not combine the acid and base/neutral extracts for samples.

10.5 Add a clean boiling chip and attach a two ball micro Snyder column to the concentrator tube. Prewet the column by adding approx 0.5 mL methylene chloride through the top. Place the apparatus in the hot water bath. Adjust the vertical position and the water temperature as required to complete the concentration in 5-10 minutes. At the proper rate of distillation, the balls of the column will actively chatter but the chambers will not flood. When the liquid reaches an apparent volume of approx 0.5 mL, remove the apparatus from the water bath and allow to drain and cool for at least 10 minutes. Remove the micro Snyder column and rinse its lower joint into the concentrator tube with approx 0.2 mL of methylene chloride. Adjust the final volume to 1.0 mL.

10.6 Transfer the concentrated extract to a clean screw-cap vial. Seal the vial with a Teflon-lined lid, and mark the level on the vial. Label with the sample number and fraction, and store in the dark at −20 to −10 °C until ready for analysis.

11. GC/MS Analysis

11.1 Establish the operating conditions given in Table 3 or 4 for analysis of the base/neutral or acid extracts, respectively. For analysis of combined extracts (Section 10.4.2), use the operating conditions in Table 3.

11.2 Bring the concentrated extract (Section 10.6) or standard (Sections 6.13 through 6.14) to room temperature and verify that any precipitate has redissolved. Verify the level on the extract (Sections 6.6 and 10.6) and bring to the mark with solvent if required.

11.3 Add the internal standard solution (Section 6.10) to the extract (use 1.0 uL of solution per 0.1 mL of extract) immediately prior to injection to minimize the possibility of loss by evaporation, adsorption, or reaction. Mix thoroughly.

11.4 Inject a volume of the standard solution or extract such that 100 ng of the internal standard will be injected, using on-column or splitless injection. For 1 mL extracts, this volume will be 1.0 uL. Start the GC column initial isothermal hold upon injection. Start MS data collection after the solvent peak elutes. Stop data collection after the benzo (ghi) perylene or pentachlorophenol peak elutes for the base/neutral or acid fraction, respectively. Return the column to the initial temperature for analysis of the next sample.

12. System and Laboratory Performance

12.1 At the beginning of each 8 hr shift during which analyses are performed, GC/MS system performance and calibration are verified for all pollutants and labeled compounds. For these tests, analysis of the 100 μg/mL calibration standard (Section 6.13) shall be used to verify all performance criteria. Adjustment and/or recalibration (per Section 7) shall be performed until all performance criteria are met. Only after all performance criteria are met may samples, blanks, and precision and recovery standards be analyzed.

12.2 DFTPP spectrum validity—inject 1 μL of the DFTPP solution (Section 6.11) either separately or within a few seconds of injection of the standard (Section 12.1) analyzed at the beginning of each shift. The criteria in Table 5 shall be met.

12.3 Retention times—the absolute retention time of 2,2′-difluorobiphenyl shall be within the range of 1078 to 1248 seconds and the relative retention times of all pollutants and labeled compounds shall fall within the limits given in Tables 3 and 4.

12.4 GC resolution—the valley height between anthracene and phenanthrene at m/z 178 (or the analogs at m/z 188) shall not exceed 10 percent of the taller of the two peaks.

12.5 Calibration verification—compute the concentration of each pollutant (Tables 1 and 2) by isotope dilution (Section 7.4) for those compounds which have labeled analogs. Compute the concentration of each pollutant which has no labeled analog by the internal standard method (Section 7.5). Compute the concentration of the labeled compounds by the internal standard method. These concentrations are computed based on the calibration data determined in Section 7.

12.5.1 For each pollutant and labeled compound being tested, compare the concentration with the calibration verification limit in Table 8. If all compounds meet the acceptance criteria, calibration has been verified and analysis of blanks, samples, and precision and recovery standards may proceed. If, however, any compound fails, the measurement system is not performing properly for that compound. In this event, prepare a fresh calibration standard or correct the problem causing the failure and repeat the test (Section 12.1), or recalibrate Section 7).

12.6 Multiple peaks—each compound injected shall give a single, distinct GC peak.

12.7 On-going precision and accuracy.

12.7.1 Analyze the extract of one of the air of precision and recovery standards Section 10.1.3) prior to analysis of samples rom the same lot.

12.7.2 Compute the concentration of ach pollutant (Tables 1 and 2) by isotope llution (Section 7.4) for those compounds hich have labeled analogs. Compute the oncentration of each pollutant which has o labeled analog by the internal standard ethod (Section 7.5). Compute the concentration of the labeled compounds by the internal standard method.

12.7.3 For each pollutant and labeled compound, compare the concentration with the limits for on-going accuracy in Table 8. If all compounds meet the acceptance criteria, system performance is acceptable and analysis of blanks and samples may proceed. If, however, any individual concentration falls outside of the range given, system performance is unacceptable for that compound.

NOTE: The large number of compounds in Table 8 present a substantial probability that one or more will fail when all compounds are analyzed. To determine if the extraction/concentration system is out of control or if the failure is caused by probability, proceed as follows:

12.7.3.1 Analyze the second aliquot of the pair of precision and recovery standard (Section 10.1.3).

12.7.3.2 Compute the concentration of only those pollutants or labeled compounds that failed the previous test (Section 12.7.3). If these compounds now pass, the extraction/concentration processes are in control and analysis of blanks and samples may proceed. If, however, any of the same compounds fail again, the extraction/concentration processes are not being performed properly for these compounds. In this event, correct the problem, re-extract the sample lot (Section 10) and repeat the on-going precision and recovery test (Section 12.7).

12.7.4 Add results which pass the specifications in Section 12.7.2 to initial and previous on-going data. Update QC charts to perform a graphic representation of continued laboratory performance (Figure 5). Develop a statement of laboratory accuracy for each pollutant and labeled compound by calculating the average percent recovery (R) and the standard deviation of percent recovery (s_r). Express the accuracy as a recovery interval from $R-2s_r$ to $R+2s_r$. For example, if $R=95\%$ and $s_r=5\%$, the accuracy is $85-105\%$.

13. Qualitative Determination

13.1 Qualititative determination is accomplished by comparison of data from analysis of a sample or blank with data from analysis of the shift standard (Section 12.1) and with data stored in the spectral libraries (Section 7.2.4). Identification is confirmed when spectra and retention times agree per the criteria below.

13.2 Labeled compounds and pollutants having no labeled analog:

13.2.1 The signals for all characteristic masses stored in the spectral library (Section 7.2.4) shall be present and shall maximize within the same two consecutive scans.

13.2.2 Either (1) the background corrected EICP areas, or (2) the corrected relative intensities of the mass spectral peaks at the GC peak maximum shall agree within a factor of two (0.5 to 2 times) for all masses stored in the library.

13.2.3 The retention time relative to the nearest eluted internal standard shall be within ±15 scans or ±15 seconds, whichever is greater of this difference in the shift standard (Section 12.1).

13.3 Pollutants having a labled analog:

13.3.1 The signals for all characteristic masses stored in the spectral library (Section 7.2.4) shall be present and shall maximize within the same two consecutive scans.

13.3.2. Either (1) the background corrected EICP areas, or (2) the corrected relative intensities of the mass spectral peaks at the GC peak maximum shall agree within a factor of two for all masses stored in the spectral library.

13.3.3. The retention time difference between the pollutant and its labeled analog shall agree within ± 6 scans or ± 6 seconds (whichever is greater) of this difference in the shift standard (Section 12.1).

13.4 Masses present in the experimental mass spectrum that are not present in the reference mass spectrum shall be accounted for by contaminant or background ions. If the experimental mass spectrum is contaminated, an experienced spectrometrist (Section 1.4) is to determine the presence or absence of the cmmpound.

14. Quantitative Determination

14.1 Isotope dilution—by adding a known amount of a labeled compound to every sample prior to extraction, correction for recovery of the pollutant can be made because the pollutant and its labeled analog exhibit the same effects upon extraction, concentration, and gas chromatography. Relative response (RR) values for mixtures are used in conjunction with calibration curves described in Section 7.4 to determine concentrations directly, so long as labeled compound spiking levels are constant. For the phenml example given in Figure 1 (Section 7.4.1), RR would be equal to 1.114. For this RR value, the phenol calibration curve given in Figure 1 indicates a concentration of 27 μg/mL in the sample extract (C_{ex}).

14.2 Internal standard—compute the concentration in the extract using the response factor determined from calibration data (Section 7.5) and the following equation: $C_{ex}(\mu g/mL)=(A_s \times C_{is}/(A_{is} \times RF)$ where C_{ex} is the concentration of the compound in the extract, and the other terms are as defined in Section 7.5.1.

14.3 The concentration of the pollutant in water is computed using the volumes of the original water sample (Section 10.1) and the final extract volume (Section 10.5), as follows: Concentration in water $(\mu g/L)=(C_{ex} \times V_{ex})/V_s$ where V_{ex} is the extract volume in mL, and V_s is the sample volume in liters.

14.4 If the EICP area at the quantitation mass for any compound exceeds the calibration range of the system, the extract of the dilute aliquot (Section 10.1) is analyzed by isotope dilution; otherwise, the extract is diluted by a factor of 10, 9 μL of internal standard solution (Section 6.10) are added to a 1.0 mL aliquot, and this diluted extract is analyzed by the internal standard method (Section 14.2). Quantify each compound at the highest concentration level within the calibration range.

14.5 Report results for all pollutants and labeled compounds (Tables 1 and 2) found in all standards, blanks, and samples in μg/L, to three significant figures. Results for samples which have been diluted are reported at the least dilute level at which the area at the quantitation mass is within the calibration range (Section 14.4) and the labeled compound recovery is within the normal range for the method (Section 15.4).

15. Analysis of Complex Samples

15.1 Untreated effluents and other samples frequently contain high levels (>1000 μg/L) of the compounds of interest, interfering compounds, and/or polymeric materials. Some samples will not concentrate to one mL (Section 10.5); others will overload the GC column and/or mass spectrometer.

15.2 Analyze the dilute aliquot (Section 10.1) when the sample will not concentrate to 1.0 mL. If a dilute aliquot was not extracted, and the sample holding time (Section 9.3) has not been exceeded, dilute an aliquot of the sample with reagent water and re-extract (Section 10.1); otherwise, dilute the extract (Section 14.4) and analyze by the internal standard method (Section 14.2).

15.3 Recovery of internal standard—the EICP area of the internal standard should be within a factor of two of the area in the shift standard (Section 12.1). If the absolute areas of the labeled compounds are within a factor of two of the respective areas in the shift standard, and the internal standard area is less than one-half of its respective area, then internal standard loss in the extract has occurred. In this case, use one of the labeled compounds (perferably a polynuclear aromatic hydrocarbon) to compute the concentration of a pollutant with no labeled analog.

15.4 Recovery of labeled compounds—in most samples, labeled compound recoveries will be similar to those from reagent water (Section 12.7). If the labeled compound recovery is outside the limits given in Table 8, the dilute extract (Section 10.1) is analyzed as in Section 14.4. If the recoveries of all labeled compounds and the internal standard are low (per the criteria above), then a loss in instrument sensitivity is the most likely cause. In this case, the 100 μg/mL calibration standard (Section 12.1) shall be analyzed and calibration verified (Section 12.5). If a loss in sensitivity has occurred, the instrument shall be repaired, the performance specifications in Section 12 shall be met, and the extract reanalyzed. If a loss in instrument sensitivity has not occurred, the method does not work on the sample being analyzed and the result may not be reported for regulatory compliance purposes.

16. *Method Performance*

16.1 Interlaboratory performance for this method is detailed in references 9 and 10.

16.2 A chromatogram of the 100 μg/mL acid/base/neutral calibration standard (Section 6.13) is shown in Figure 6.

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5. "Reference Compound to Calibrate Ion Abundance Measurement in Gas Chromatography-Mass Spectrometry Systems," J.W. Eichelberger, L.E. Harris, and W.L. Budde, Anal. Chem., 47, 955 (1975).

6. "Handbook of Analytical Quality Control in Water and Wastewater Laboratories," USEPA, EMSL/Cincinnati, OH 45268, EPA-600/4-79-019 (March 1979).

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8. "Methods 330.4 and 330.5 for Total Residual Chlorine," USEPA, EMSL/ Cincinnati, OH 45268, EPA 600/4-70-020 (March 1979).

9. Colby, B.N., Beimer, R.G., Rushneck, D.R., and Telliard, W.A., "Isotope Dilution Gas Chromatography-Mass Spectrometry for the determination of Priority Pollutants in Industrial Effluents." USEPA, Effluent Guidelines Division, Washington, DC 20460 (1980).

10. "Inter-laboratory Validation of US Environmental Protection Agency Method 1625," USEPA, Effluent Guidelines Division, Washington, DC 20460 (June 15, 1984).

TABLE 1.—Base/Neutral Extractable Compounds

Compound	STORET	CAS registry	EPA-EGD	NPDES
Acenaphthene	34205	83-32-9	001 B	001 B
Acenaphthylene	34200	208-96-8	077 B	002 B
Anthracene	34220	120-12-7	078 B	003 B
Benzidine	39120	92-87-5	005 B	004 B
Benzo(a)anthracene	34526	56-55-3	072 B	005 B
Benzo(b)fluoranthene	34230	205-99-2	074 B	007 B
Benzo(k)fluoranthene	34242	207-08-9	075 B	009 B
Benzo(a)pyrene	34247	50-32-8	073 B	006 B
Benzo(ghi)perylene	34521	191-24-2	079 B	008 B
Biphenyl (Appendix C)	81513	92-52-4	512 B	....
Bis(2-chloroethyl) ether	34273	111-44-4	018 B	011 B
Bis(2-chloroethoxy)methane	34278	111-91-1	043 B	010 B
Bis(2-chloroisopropyl) ether	34283	108-60-1	042 B	012 B
Bis(2-ethylhexyl) phthalate	39100	117-81-7	066 B	013 B
4-bromophenyl phenyl ether	34636	101-55-3	041 B	014 B
Butyl benzyl phthalate	34292	85-68-7	067 B	015 B
n-C10 (Appendix C)	77427	124-18-5	517 B	....
n-C12 (Appendix C)	77588	112-40-2	506 B	....
n-C14 (Appendix C)	77691	629-59-4	518 B	....
n-C16 (Appendix C)	77757	544-76-3	519 B	....
n-C18 (Appendix C)	77804	593-45-3	520 B	....
n-C20 (Appendix C)	77830	112-95-8	521 B	....
n-C22 (Appendix C)	77859	629-97-0	522 B	....
n-C24 (Appendix C)	77886	646-31-1	523 B	....
n-C26 (Appendix C)	77901	630-01-3	524 B	....
n-C28 (Appendix C)	78116	630-02-4	525 B	....
n-C30 (Appendix C)	78117	638-68-6	526 B	....
Carbazole (4c)	77571	86-74-8	528 B	....
2-chloronaphthalene	34581	91-58-7	020 B	016 B
4-chlorophenyl phenyl ether	34641	7005-72-3	040 B	017 B
Chrysene	34320	218-01-9	076 B	018 B

TABLE 1.—Base/Neutral Extractable Compounds—Continued

Compound	STORET	CAS registry	EPA-EGD	NPDES
P-cymene (Appendix C)	77356	99-87-6	513 B	....
Dibenzo(a,h)anthracene	34556	53-70-3	082 B	019 B
Dibenzofuran (Appendix C and 4c)	81302	132-64-9	505 B	....
Dibenzothiophene (Synfuel)	77639	132-65-0	504 B	....
Di-n-butyl phthalate	39110	84-74-2	068 B	026 B
1,2-dichlorobenzene	34536	95-50-1	025 B	020 B
1,3-dichlorobenzene	34566	541-73-1	026 B	021 B
1,4-dichlorobenzene	34571	106-46-7	027 B	022 B
3,3'-dichlorobenzidine	34631	91-94-1	028 B	023 B
Diethyl phthalate	34336	84-66-2	070 B	024 B
2,4-dimethylphenol	34606	105-67-9	034 A	003 A
Dimethyl phthalate	34341	131-11-3	071 B	025 B
2,4-dinitrotoluene	34611	121-14-2	035 B	027 B
2,6-dinitrotoluene	34626	606-20-2	036 B	028 B
Di-n-octyl phthalate	34596	117-84-0	069 B	029 B
Diphenylamine (Appendix C)	77579	122-39-4	507 B	....
Diphenyl ether (Appendix C)	77587	101-84-8	508 B	....
1,2-diphenylhydrazine	34346	122-66-7	037 B	030 B
Fluoranthene	34376	206-44-0	039 B	031 B
Fluorene	34381	86-73-7	080 B	032 B
Hexachlorobenzene	39700	118-74-1	009 B	033 B
Hexachlorobutadiene	34391	87-68-3	052 B	034 B
Hexachloroethane	34396	67-72-1	012 B	036 B
Hexachlorocyclopentadiene	34386	77-47-4	053 B	035 B
Indeno(1,2,3-cd)pyrene	34403	193-39-5	083 B	037 B
Isophorone	34408	78-59-1	054 B	038 B
Naphthalene	34696	91-20-3	055 B	039 B
B-naphthylamine (Appendix, C)	82553	91-59-8	502 B	....
Nitrobenzene	34447	98-95-3	056 B	040 B
N-nitrosodimethylamine	34438	62-75-9	061 B	041 B
N-nitrosodi-n-propylamine	34428	621-64-7	063 B	042 B
N-nitrosodiphenylamine	34433	86-30-3	062 B	043 B
Phenanthrene	34461	85-01-8	081 B	044 B
Phenol	34694	108-95-2	065 A	010 A
a-Picoline (Synfuel)	77088	109-06-89	503 B	....
Pyrene	34469	129-00-0	084 B	045 B
styrene (Appendix C)	77128	100-42-5	510 B	....
a-terpineol (Appendix C)	77493	98-55-5	509 B	....
1,2,3-trichlorobenzene (4c)	77613	87-61-6	529 B	....
1,2,4-trichlorobenzene	34551	120-82-1	008 B	046 B

TABLE 2.—Acid Extractable Compounds

Compound	STORET	CAS registry	EPA-EGD	NPDES
4-chloro-3-methylphenol	34452	59-50-7	022 A	008 A
2-chlorophenol	34586	95-57-8	024 A	001 A
2,4-dichlorophenol	34601	120-83-2	031 A	002 A
2,4-dinitrophenol	34616	51-28-5	059 A	005 A
2-methyl-4,6-dinitrophenol	34657	534-52-1	060 A	004 A
2-nitrophenol	34591	88-75-5	057 A	006 A
4-nitrophenol	34646	100-02-7	058 A	007 A
Pentachlorophenol	39032	87-86-5	064 A	009 A
2,3,6-trichlorophenol (4c)	77688	93-37-55	530 A	....
2,4,5-trichlorophenol (4c)	....	95-95-4	531 A	....
2,4,6-trichlorophenol	34621	88-06-2	021 A	011 A

TABLE 3.—GAS CHROMATOGRAPHY OF BASE/NEUTRAL EXTRACTABLE COMPOUNDS

EGD No.[1]	Compound	Retention time			Detection limit[2] (µg/L)
		Mean (sec)	EGD Ref	Relative	
164	2,2'-difluorobiphenyl (int std)	1163	164	1.000–1.000	10
061	N-nitrosodimethylamine	385	164	ns	50
603	alpha picoline-d7	417	164	0.326–0.393	50
703	alpha picoline	426	603	1.006–1.028	50
610	styrene-d5	546	164	0.450–0.488	10
710	styrene	549	610	1.002–1.009	10
613	p-cymene-d14	742	164	0.624–0.652	10
713	p-cymene	755	613	1.008–1.023	10
265	phenol-d5	696	164	0.584–0.613	10
365	phenol	700	265	0.995–1.010	10
218	bis(2-chloroethyl) ether-d8	696	164	0.584–0.607	10
318	bis(2-chloroethyl) ether	704	218	1.007–1.016	10
617	n-decane-d22	696	164	0.585–0.615	10
717	n-decane	720	617	1.022–1.038	10
226	1,3-dichlorobenzene-d4	722	164	0.605–0.636	10
326	1,3-dichlorobenzene	724	226	0.998–1.008	10
227	1,4-dichlorobenzene-d4	737	164	0.601–0.666	10
327	1,4-dichlorobenzene	740	227	0.997–1.009	10
225	1,2-dichlorobenzene-d4	758	164	0.632–0.667	10
325	1,2-dichlorobenzene	760	225	0.995–1.008	10
242	bis(2-chloroisopropyl) ether-d12	788	164	0.664–0.691	10
342	bis(2-chloroisopropyl) ether	799	242	1.010–1.016	10
212	hexachloroethane-13C	819	164	0.690–0.717	10
312	hexachloroethane	823	212	0.999–1.001	10
063	N-nitrosodi-n-propylamine	830	164	ns	20
256	nitrobenzene-d5	845	164	0.706–0.727	10
356	nitrobenzene	849	256	1.002–1.007	10
254	isophorone-d8	881	164	0.747–0.767	10
354	isophorone	889	254	0.999–1.017	10
234	2,4-dimethyl phenol-d3	921	164	0.781–0.803	10
334	2,4-dimethylphenol	924	234	0.999–1.003	10
043	bis(2-chloroethoxy) methane	939	164	ns	10
208	1,2,4-trichlorobenzene-d3	955	164	0.813–0.830	10
308	1,2,4-trichlorobenzene	958	208	1.000–1.005	10
255	naphthalene-d8	963	164	0.819–0.836	10
355	naphthalene	967	255	1.001–1.006	10
609	alpha-terpineol-d3	973	164	0.829–0.844	10
709	alpha-terpineol	975	609	0.998–1.008	10
606	n-dodecane-d26	953	164	0.730–0.908	10
706	n-dodecane	981	606	0.966–1.051	10
529	1,2,3-trichlorobenzene	1003	164	ns	10
252	hexachlorobutadiene-13C4	1005	164	0.856–0.871	10
352	hexachlorobutadiene	1006	252	0.999–1.002	10
253	hexachlorocyclopentadiene-13C4	1147	164	0.976–0.986	10
353	hexachlorocyclopentadiene	1142	253	0.999–1.001	10
220	2-chloronaphthalene-d7	1185	164	1.014–1.024	10
320	2-chloronaphthalene	1200	220	0.997–1.007	10
518	n-tetradecane	1203	164	ns	10
612	Biphenyl-d10	1205	164	1.016–1.027	10
712	Biphenyl	1195	612	1.001–1.006	10
08	Diphenyl ether-d10	1211	164	1.036–1.047	10
08	Diphenyl ether	1216	608	0.997–1.009	10
277	Acenaphthylene-d8	1265	164	1.080–1.095	10
77	Acenaphthylene	1247	277	1.000–1.004	10
71	Dimethyl phthalate-d4	1269	164	1.083–1.102	10
71	Dimethyl phthalate	1273	271	0.998–1.005	10
36	2,6-dinitrotoluene-d3	1283	164	1.090–1.112	10
36	2,6-dinitrotoluene	1300	236	1.001–1.005	10
01	Acenaphthene-d10	1298	164	1.107–1.125	10
01	Acenaphthene	1304	201	0.999–1.009	10
05	Dibenzofuran-d8	1331	164	1.134–1.155	10
05	Dibenzofuran	1335	605	0.998–1.007	10
02	Beta-naphthylamine-d7	1368	164	1.163–1.189	50
02	Beta-naphthylamine	1371	602	0.996–1.007	50
0	Fluorene-d10	1395	164	1.185–1.214	10
0	Fluorene	1401	281	0.999–1.008	10
0	4-chlorophenyl phenyl ether-d5	1406	164	1.194–1.223	10
0	4-chlorophenyl phenyl ether	1409	240	0.990–1.015	10

TABLE 3.—GAS CHROMATOGRAPHY OF BASE/NEUTRAL EXTRACTABLE COMPOUNDS—Continued

EGD No.[1]	Compound	Retention time			Detection limit[2] (μg/L)
		Mean (sec)	EGD Ref	Relative	
270	Diethyl phthalate-d4	1409	164	1.197–1.229	10
370	Diethyl phthalate	1414	270	0.996–1.006	10
619	n-hexadecane-d34	1447	164	1.010–1.478	10
719	n-hexadecane	1469	619	1.013–1.020	10
235	2,4-dinitrotoluene-d3	1359	164	1.152–1.161	10
335	2,4-dinitrotoluene	1344	235	1.000–1.002	10
237	1,2-diphenylhydrazine-d8	1433	164	1.216–1.248	20
337	1,2-diphenylhydrazine (3)	1439	237	0.999–1.009	20
607	Diphenylamine–d10	1437	164	1.213–1.249	20
707	Diphenylamine	1439	607	1.000–1.007	20
262	N-nitrosodiphenylamine-d6	1447	164	1.225–1.252	20
362	N-nitrosodiphenylamine (4)	1464	262	1.000–1.002	20
041	4-bromophenyl phenyl ether	1498	164	1.271–1.307	10
209	Hexachlorobenzene-13C6	1521	164	1.288–1.327	10
309	Hexachlorobenzene	1522	209	0.999–1.001	10
281	Phenanthrene-d10	1578	164	1.334–1.380	10
520	n-octadecane	1580	164	ns	10
381	Phenanthrene	1583	281	1.000–1.005	10
278	Anthracene-d10	1588	164	1.342–1.388	10
378	Anthracene	1592	278	0.998–1.006	10
604	Dibenzothiophene-d8	1559	164	1.314–1.361	10
704	Dibenzothiophene	1564	604	1.000–1.006	10
528	Carbazole	1650	164	ns	20
621	n-eicosane-d42	1655	164	1.184–1.662	10
721	n-eicosane	1677	621	1.010–1.021	10
268	Di-n-butyl phthalate-d4	1719	164	1.446–1.510	10
368	Di-n-butyl phthalate	1723	268	1.000–1.003	10
239	Fluoranthene-d10	1813	164	1.522–1.596	10
339	Fluoranthene	1817	239	1.000–1.004	10
284	Pyrene-d10	1844	164	1.523–1.644	10
384	Pyrene	1852	284	1.001–1.003	10
205	Benzidine-d8	1854	164	1.549–1.632	50
305	Benzidine	1853	205	1.000–1.002	50
522	n-docosane	1889	164	ns	10
623	n-tetracosane-d50	1997	164	1.671–1.764	10
723	n-tetracosane	2025	612	1.012–1.015	10
067	Butylbenzyl phthalate	2060	164	ns	10
276	Chrysene-d12	2081	164	1.743–1.837	10
376	Chrysene	2083	276	1.000–1.004	10
272	Benzo(a)anthracene-d12	2082	164	1.735–1.846	10
372	Benzo(a)anthracene	2090	272	0.999–1.007	10
228	3,3′-dichlorobenzidine-d6	2088	164	1.744–1.848	50
328	3,3′-dichlorobenzidine	2086	228	1.000–1.001	50
266	Bis(2-ethylhexyl) phthalate-d4	2123	164	1.771–1.880	10
366	Bis(2-ethylhexyl) phthalate	2124	266	1.000–1.002	10
524	n-hexacosane	2147	164	ns	10
269	di-n-octyl phthalate-d4	2239	164	1.867–1.982	10
369	di-n-octyl phthalate	2240	269	1.000–1.002	10
525	n-octacosane	2272	164	ns	10
274	Benzo(b)fluoranthene-d12	2281	164	1.902–2.025	10
354	Benzo(b)fluoranthene	2293	274	1.000–1.005	10
275	Benzo(k)fluoranthene-d12	2287	164	1.906–2.033	10
375	Benzo(k)fluoranthene	2293	275	1.000–1.005	10
273	Benzo(a)pyrene-d12	2351	164	1.954–2.088	10
373	Benzo(a)pyrene	2350	273	1.000–1.004	10
626	N-triacontane-d62	2384	164	1.972–2.127	10
726	N-triacontane	2429	626	1.011–1.028	10
083	Indeno(1,2,3-cd)pyrene	2650	164	ns	20
082	Dibenzo(a,h)anthracene	2660	164	ns	20
279	Benzo(ghi)perylene-d12	2741	164	2.187–2.524	20
379	Benzc(ghi)perylene	2750	279	1.001–1.006	20

[1] Reference numbers beginning with 0, 1 or 5 indicate a pollutant quantified by the internal standard method; reference numbers beginning with 2 or 6 indicate a labeled compound quantified by the internal standard method; reference numbers beginning with 3 or 7 indicate a pollutant quantified by isotope dilution.

[2] This is a minimum level at which the entire GC/MS system must give recognizable mass spectra (background corrected and acceptable calibration points.

[3] Detected as azobenzene.

[4] Detected as diphenylamine.

ns = specification not available at time of release of method.
Column: 30 ±2 m × 0.25 ±0.02 mm i.d. 94% methyl, 4% phenyl, 1% vinyl bonded phase fused silica capillary.
Temperature program: 5 min at 30 °C; 30 - 280 °C at 8 °C per min; isothermal at 280 °C until benzo(ghi)perylene elutes.
Gas velocity: 30 ±5 cm/sec.

TABLE 4.—GAS CHROMATOGRAPHY OF ACID EXTRACTABLE COMPOUNDS

EGD No. [1]	Compound	Retention time			Detection limit [3] (µg/L)
		Mean (sec)	EGD Ref	Relative	
164	2,2'-difluorobiphenyl (int std)	1163	164	1.000–1.000	10
224	2-chlorophenol-d4	701	164	0.587–0.618	10
324	2-chlorophenol	705	224	0.997–1.010	10
257	2-nitrophenol-d4	898	164	0.761–0.783	20
357	2-nitrophenol	900	257	0.994–1.009	20
231	2,4-dichlorophenol-d3	944	164	0.802–0.822	10
331	2,4-dichlorophenol	947	231	0.997–1.006	10
222	4-chloro-3-methylphenol-d2	1086	164	0.930–0.943	10
322	4-chloro-3-methylphenol	1091	222	0.998–1.003	10
221	2,4,6-trichlorophenol-d2	1162	164	0.994–1.005	10
321	2,4,6-trichlorophenol	1165	221	0.998–1.004	10
531	2,4,5-trichlorophenol	1170	164	ns	10
530	2,3,6-trichlorophenol	1195	164	ns	10
259	2,4-dinitrophenol-d3	1323	164	1.127–1.149	10
359	2,4-dinitrophenol	1325	259	1.000–1.005	50
258	4-nitrophenol-d4	1349	164	1.147–1.175	50
358	4-nitrophenol	1354	258	0.997–1.006	50
260	2-methyl-4,6-dinitrophenol-d2	1433	164	1.216–1.249	50
360	2-methyl-4,6-dinitrophenol	1435	260	1.000–1.002	20
264	Pentachlorophenol-13C6	1559	164	1.320–1.363	20
364	Pentachlorophenol	1561	264	0.998–1.002	50

[1] Reference numbers beginning with 0, 1 or 5 indicate a pollutant quantified by the internal standard method; reference
umbers beginning with 2 or 6 indicate a labeled compound quantified by the internal standard method; reference numbers
eginning with 3 or 7 indicate a pollutant quantified by isotope dilution.

[3] This is a minimum level at which the entire GC/MS system must give recognizable mass spectra (background corrected)
d acceptable calibration points.

ns=specification not available at time of release of method.
Column: 30±2m×0.25±0.02mm i.d. 94% methyl, 4% phenyl, 1% vinyl bonded phase fused silica capillary.
Temperature program: 5 min at 30 °C; 8°C/min. to 250°C or until pentachlorophenol elutes.
Gas velocity: 30±5 cm/sec.

TABLE 5.—DFTPP MASS INTENSITY SPECIFICATIONS

ass	Intensity required
51	30–60 percent of mass 198.
68	Less than 2 percent of mass 69.
70	Less than 2 percent of mass 69.
27	40–60 percent of mass 198.
97	Less than 1 percent of mass 198.
99	5–9 percent of mass 198.
75	10–30 percent of mass 198.
65	greater than 1 percent of mass 198
41	present and less than mass 443
42	40–100 percent of mass 198.
43	17–23 percent of mass 442.

TABLE 6.—BASE/NEUTRAL EXTRACTABLE COMPOUND CHARACTERISTIC MASSES

Compound	Labeled analog	Primary m/z
aphthene	d10	154/164
aphthylene	d8	152/160
racene	d10	178/188
idine	d8	184/192
o(a)anthracene	d12	228/240

TABLE 6.—BASE/NEUTRAL EXTRACTABLE COMPOUND CHARACTERISTIC MASSES—Continued

Compound	Labeled analog	Primary m/z
Benzo(b)fluoranthene	d12	252/264
Benzo(k)fluoranthene	d12	252/264
Benzo(a)pyrene	d12	252/264
Benzo(ghi)perylene	d12	276/288
Biphenyl	d10	154/164
Bis(2-chloroethyl) ether	d8	93/101
Bis(2-chloroethoxy)methane		93
Bis(2-chloroisopropyl) ether	d12	121/131
Bis(2-ethylhexyl) phthalate	d4	149/153
4-bromophenyl phenyl ether		248
Butyl benzyl phthalate		149
n-C10	d22	55/66
n-C12	d26	55/66
n-C14		55
n-C16	d34	55/66
n-C18		55
n-C20	d42	55/66
n-C22		55
n-C24	d50	55/66
n-C26		55
n-C28		55
n-C30	d62	55/66
Carbazole	d8	167/175

TABLE 6.—BASE/NEUTRAL EXTRACTABLE COMPOUND CHARACTERISTIC MASSES—Continued

Compound	Labeled analog	Primary m/z
2-chloronaphthalene	d7	162/169
4-chlorophenyl phenyl ether	d5	204/209
Chrysene	d12	228/240
p-cymene	d14	114/130
Dibenzo(a,h)anthracene		278
Dibenzofuran	d8	168/176
Dibenzothiophene	d8	184/192
Di-n-butyl phthalate	d4	149/153
1,2-dichlorobenzene	d4	146/152
1,3-dichlorobenzene	d4	146/152
1,4-dichlorobenzene	d4	146/152
3,3′-dichlorobenzidine	d6	252/258
Diethyl phthalate	d4	149/153
2,4-dimethylphenol	d3	122/125
Dimethyl phthalate	d4	163/167
2,4-dinitrotoluene	d3	164/168
2,6-dinitrotoluene	d3	165/167
Di-n-octyl phthalate	d4	149/153
Diphenylamine	d10	169/179
Diphenyl ether	d10	170/180
1,2-diphenylhydrazine [1]	d10	77/82
Fluoranthene	d10	202/212
Fluorene	d10	166/176
Hexachlorobenzene	13C6	284/292
Hexachlorobutadiene	13C4	225/231
Hexachloroethane	13C	201/204
Hexachlorocyclopentadiene	13C4	237/241
Ideno(1,2,3-cd)pyrene		276
Isophorone	d8	82/88
Naphthalene	d8	128/136
B-naphthylamine	d7	143/150
Nitrobenzene	d5	123/128
N-nitrosodimethylamine		74
N-nitrosodi-n-propylamine		70
N-nitrosodiphenylamile [2]	d6	169/175
Phenanthrene	d10	178/188
Phenol	d5	94/71
a-picoline	d7	93/100
Pyrene	d10	202/212
Styrene	d5	104/109
a-terpineol	d3	59/62
1,2,3-trichlorobenzene	d3	180/183
1,2,4-trichlorobenzene	d3	180/183

[1] Detected as azobenzene.
[2] Detected as diphenylamine.

TABLE 7.—ACID EXTRACTABLE COMPOUND CHARACTERISTIC MASSES

Compound	Labeled analog	Primary m/z
4-chloro-3-methylphenol	d2	107/109
2-chlorophenol	d4	128/132
2,4-dichlorophenol	d3	162/167
2,4-dinitrophenol	d3	184/187
2-methyl-4,6-dinitrophenol	d2	198/200
2-nitrophenol	d4	139/143
4-nitrophenol	d4	139/143
Pentachlorophenol	13C6	266/272
2,3,6-trichlorophenol	d2	196/200
2,4,5-trichlorophenol	d2	196/200
2,4,6-trichlorophenol	d2	196/200

TABLE 8.—ACCEPTANCE CRITERIA FOR PERFORMANCE TESTS

EGD No. [1]	Compound	Acceptance criteria				
		Initial precision and accuracy section 8.2.3 (μg/L)		Labeled compound recovery sec. 8.3 and 14.2 P (percent)	Calibration verification sec. 12.5 (μg/mL)	On-going accuracy sec. 11.6 P (μg/L)
		s	X			
301	Acenaphthene	21	79–134		80–125	72-144
201	Acenaphthene-d10	38	38–147	20–270	71–141	30-180
377	Acenaphtylene	38	69–186		60–166	61-207
277	Acenaphthylene-d8	31	38–146	23–239	66–152	33-168
378	Anthracene	41	58–174		60–168	50-199
278	Anthracene-d10	49	31–194	14–419	58–171	23-242
305	Benzidine	119	16–518		34–296	11-672
205	Benzidine-d8	269	ns–ns	ns–ns	ns–ns	ns-ns
372	Benzo(a)anthracene	20	65–168		70–142	62-176
272	Benzo(a)anthracene-d12	41	25–298	12–605	28–357	22-329
374	Benzo(b)fluoranthene	183	32–545		61–164	20-ns
274	Benzo(b)fluoranthene-d12	168	11–577	ns–ns	14–ns	ns-ns
375	Benzo(k)fluoranthene	26	59–143		13–ns	53-155
275	Benzo(k)fluoranthene-d12	114	15–514	ns–ns	13–ns	ns-485
373	Benzo(a)pyrene	26	62–195		78–129	59-206
273	Benzo(a)pyrene-d12	24	35–181	21–290	12–ns	32-194
379	Benzo(ghi)perylene	21	72–160		69–145	58-168
279	Benzo(ghi)perylene-d12	45	29–268	14–529	13–ns	25-303
712	Biphenyl (Appendix C)	41	75–148		58–171	62-176
612	Biphenyl-d12	43	28–165	ns–ns	52–192	17-267
318	Bis(2-chloroethyl) ether	34	55–196		61–164	50-213

TABLE 8.—ACCEPTANCE CRITERIA FOR PERFORMANCE TESTS—Continued

EGD No.[1]	Compound	Acceptance criteria				
		Initial precision and accuracy section 8.2.3 (µg/L)		Labeled compound recovery sec. 8.3 and 14.2 P (percent)	Calibration verification sec. 12.5 (µg/mL)	On-going accuracy sec. 11.6 R (µg/L)
		s	X			
216	Bis(2-chloroethyl) ether-d8	33	29-196	15-372	52-194	25-222
043	Bis(2-chloroethoxy)methane*	27	43-153		44-228	39-166
342	Bis(2-chloroisopropyl) ether	17	81-138		67-148	77-145
242	Bis(2-chloroisopropyl)ether-d12	27	35-149	20-260	44-229	30-169
366	Bis(2-ethylhexyl) phthalate	31	69-220		76-131	64-232
266	Bis(2-ethylhexyl) phthalate-d4	29	32-205	18-364	43-232	28-224
041	4-bromophenyl phenyl ether*	44	44-140		52-193	35-172
067	Butyl benzyl phthalate*	31	19-233		22-450	35-170
717	n-C10 (Appendix C)	51	24-195		42-235	19-237
617	n-C10-d22	70	ns-298	ns-ns	44-227	ns-504
706	n-C12 (Appendix C)	74	35-369		60-166	29-424
606	n-C12-d26	53	ns-331	ns-ns	41-242	ns-408
518	n-C14 (Appendix C)*	109	ns-985		37-268	ns-ns
719	n-C16 (Appendix C)	33	80-162		72-138	71-181
619	n-C16-d34	46	37-162	18-308	54-186	28-202
520	n-C18 (Appendix C)*	39	42-131		40-249	35-167
721	n-C20 (Appendix C)	59	53-263		54-184	46-301
621	n-C20-d42	34	34-172	19-306	62-162	29-198
522	n-C22 (Appendix C)*	31	45-152		40-249	39-195
723	n-C24 (Appendix C)	11	80-139		65-154	78-142
623	n-C24-d50	28	27-211	15-376	50-199	25-229
524	n-C26 (Appendix C)*	35	35-193		26-392	31-212
525	n-C28 (Appendix C)*	35	35-193		26-392	31-212
726	n-C30 (Appendix C)	32	61-200		66-152	56-215
626	n-C30-d62	41	27-242	13-479	24-423	23-274
528	Carbazole (4c)*	38	36-165		44-227	31-188
320	2-chloronaphthalene	100	46-357		58-171	35-442
220	2-chloronaphthalene-d7	41	30-168	15-324	72-139	24-204
322	4-chloro-3-methylphenol	37	76-131		85-115	62-159
222	4-chloro-3-methylphenol-d2	111	30-174	ns-613	68-147	14-314
324	2-chlorophenol	13	79-135		78-129	76-138
224	2-chlorophenol-d4	24	36-162	23-255	55-180	33-176
340	4-chlorophenyl phenyl ether	42	75-166		71-142	63-194
240	4-chlorophenyl phenyl ether-d5	52	40-161	19-325	57-175	29-212
376	Chrysene	51	59-186		70-142	48-221
276	Chrysene-d12	69	33-219	13-512	24-411	23-290
713	p-cymene (Appendix C)	18	76-140		79-127	72-147
613	p-cymene-d14	67	ns-359	ns-ns	66-152	ns-468
082	Dibenzo(a,h)anthracene*	55	23-299		13-761	19-340
705	Dibenzofuran (Appendix C)	20	85-136		73-136	79-146
605	Dibenzofuran-d8	31	47-136	28-220	66-150	39-160
704	Dibenzothiophene (Synfuel)	31	79-150		72-140	70-168
604	Dibenzothiophene-d8	31	48-130	29-215	69-145	40-156
368	Di-n-butyl phthalate	15	76-165		71-142	74-169
268	Di-n-butyl phthalate-d4	23	23-195	13-346	52-192	22-209
325	1,2-dichlorobenzene	17	73-146		74-135	70-152
225	1,2-dichlorobenzene-d4	35	14-212	ns-494	61-164	11-247
326	1,3-dichlorobenzene	43	63-201		65-154	55-225
226	1,3-dichlorobenzene-d4	48	13-203	ns-550	52-192	ns-260
327	1,4-dichlorobenzene	42	61-194		62-161	53-219
227	1,4-dichlorobenzene-d4	48	15-193	ns-474	65-153	11-245
328	3,3'-dichlorobenzidine	26	68-174		77-130	64-185
228	3,3'-dichlorobenzidine-d6	80	ns-562	ns-ns	18-558	ns-ns
331	2,4-dichlorophenol	12	85-131		67-149	83-135
231	2,4-dichlorophenol-d3	28	38-164	24-260	64-157	34-182
370	Diethyl phthalate	44	75-196		74-135	65-222
270	Diethyl phthalate-d4	78	ns-260	ns-ns	47-211	ns-ns
334	2,4-dimethylphenol	13	62-153		67-150	60-156
234	2,4-dimethylphenol-d3	22	15-228	ns-449	58-172	14-242
371	Dimethyl phthalate	36	74-188		73-137	67-207
271	Dimethyl phthalate-d4	108	ns-640	ns-ns	50-201	ns-ns
359	2,4-dinitrophenol	18	72-134		75-133	68-141
259	2,4-dinitrophenol-d3	66	22-308	ns-ns	39-256	17-378
335	2,4-dinitrotoluene	18	75-158		79-127	72-164
235	2,4-dinitrotoluene-d3	37	22-245	10-514	53-187	19-275

TABLE 8.—ACCEPTANCE CRITERIA FOR PERFORMANCE TESTS—Continued

EGD No.[1]	Compound	Acceptance criteria				
		Initial precision and accuracy section 8.2.3 (µg/L)		Labeled compound recovery sec. 8.3 and 14.2 P (percent)	Calibration verification sec. 12.5 (µg/mL)	On-going accuracy sec. 11.6 R (µg/L)
		s	X			
336	2,6-dinitrotoluene	30	80–141		55–183	70-15
236	2,6-dinitrotoluene-d3	59	44–184	17–442	36–278	31-2
369	Di-n-octyl phthalate	16	77–161		71–140	74-1
269	Di-n-octyl phthalate-d4	46	12–383	ns–ns	21–467	10-4
707	Diphenylamine (Appendix C)	45	58–205		57–176	51-2
607	Diphenylamine-d10	42	27–206	11–468	59–169	21-2
708	Diphenyl ether (Appendix C)	19	82–136		83–120	77-144
608	Diphenyl ether-d10	37	36–155	19–261	77–129	29-1
337	1,2-diphenylhydrazine	73	49–308		75–134	40-3
237	1,2-diphenylhydrazine-d10	35	31–173	17–316	58–174	26-2
339	Fluoranthene	33	71–177		67–149	64-1
239	Fluoranthene-d10	35	36–161	20–276	47–215	30-1
380	Fluorene	29	81–132		74–135	70-1
280	Fluorene-d10	43	51–131	27–238	61–164	36-172
309	Hexachlorobenzene	16	90–124		78–126	85-132
209	Hexachlorobenzene-13C6	81	36–228	13–595	38–265	23-3
352	hexachlorobutadiene	56	51–251		74–135	43-2
252	hexachlorobutadiene-13C4	63	ns–316	ns–ns	68–148	ns-41
312	hexachloroethane	227	21–ns		71–141	13-ns
212	hexachloroethane-13C1	77	ns–400	ns–ns	47–212	ns-5
353	hexachlorocyclopentadiene	15	69–144		77–129	67-14
253	hexachlorocyclopentadiene-13C4	60	ns–ns	ns–ns	47–211	ns-ns
383	ideno(1,2,3-cd)pyrene*	55	23–299		13–761	19-3
354	isophorone	25	76–156		70–142	70-1
254	isophorone-d8	23	49–133	33–193	52–194	44-1
360	2-methyl-4,6-dinitrophenol	19	77–133		69–145	72-1
260	2-methyl-4,6-dinitrophenol-d2	64	36–247	16–527	56–177	28-3
355	naphthalene	20	80–139		73–137	75-1
255	naphthalene-d8	39	28–157	14–305	71–141	22-1
702	B-naphthylamine (Appendix C)	49	10–ns		39–256	ns-ns
602	B-naphthylamine-d7	33	ns–ns	ns–ns	44–230	ns-ns
356	nitrobenzene	25	69–161		85–115	65-1
256	nitrobenzene-d5	28	18–265	ns–ns	46–219	15-31
357	2-nitrophenol	15	78–140		77–129	75-1
257	2-nitrophenol-d4	23	41–145	27–217	61–163	37-1
358	4-nitrophenol	42	62–146		55–183	51-17
258	4-nitrophenol-d4	188	14–398	ns–ns	35–287	ns-ns
061	N-nitrosodimethylamile*	198	21–472		40–249	12-
063	N-nitrosodi-n-proplyamine*	198	21–472		40–249	12-
362	N-nitrosodiphenylamine	45	65–142		68–148	53-17
262	N-nitrosodiphenylamine-d6	37	54–126	26–256	59–170	40-1
364	pentachlorophenol	21	76–140		77–130	71-1
264	pentachlorophenol-13C6	49	37–212	18–412	42–237	29-
381	phenanthrene	13	93–119		75–133	87-1
281	phenanthrene-d10	40	45–130	24–241	67–149	34-1
365	phenol	36	77–127		65–155	62-1
265	phenol-d5	161	21–210	ns–ns	48–208	ns-
703	a-picoline (Synfuel)	38	59–149		60–165	59-1
603	a-picoline-d7	138	11–380	ns–ns	31–324	ns-
384	pyrene	19	76–152		76–132	72-1
284	pyrene-d10	29	32–176	18–303	48–210	29-1
710	styrene (Appendix C)	42	53–221		65–153	48-
610	styrene-d5	49	ns–281	ns–ns	44–228	ns-
709	a-terpineol (Appendix C)	44	42–234		54–186	36-
609	a-terpineol-d3	48	22–292	ns–672	20–502	18-
529	1,2,3-trichlorobenzene (4c)*	69	15–229		60–167	11-
308	1,2,4-trichlorobenzene	19	82–136		78–128	77-1
208	1,2,4-trichlorobenzene-d3	57	15–212	ns–592	61–163	10-
530	2,3,6-trichlorophenol (4c)*	30	58–137		56–180	51-1
531	2,4,5-trichlorophenol (4c)*	30	58–137		56–180	51-1
321	2,4,6-trichlorophenol	57	59–205		81–123	48-
221	2,4,6-trichlorophenol-d2	47	43–183	21–363	69–144	34-

[1] Reference numbers beginning with 0, 1 or 5 indicate a pollutant quantified by the internal standard method; reference numbers beginning with 2 or 6 indicate a labeled compound quantified by the internal standard method; reference numbers beginning with 3 or 7 indicate a pollutant quantified by isotope dilution.

[2] Measured by internal standard; specification derived from related compound.

ns=no specification; limit is outside the range that can be measured reliably.

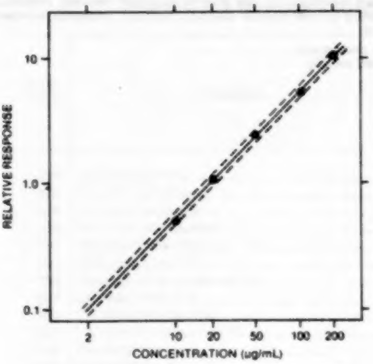

FIGURE 1 Relative Response Calibration Curve for Phenol. The Dotted Lines Enclose a ± 10 Percent Error Window.

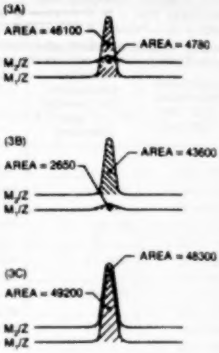

FIGURE 3 Extracted Ion Current Profiles for (3A) Unlabeled Compound, (3B) Labeled Compound, and (3C) Equal Mixture of Unlabeled and Labeled Compounds.

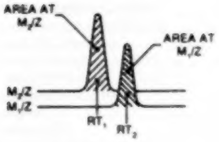

FIGURE 2 Extracted Ion Current Profiles for Chromatographically Resolved Labeled (m_2/z) and Unlabeled (m_1/z) Pairs.

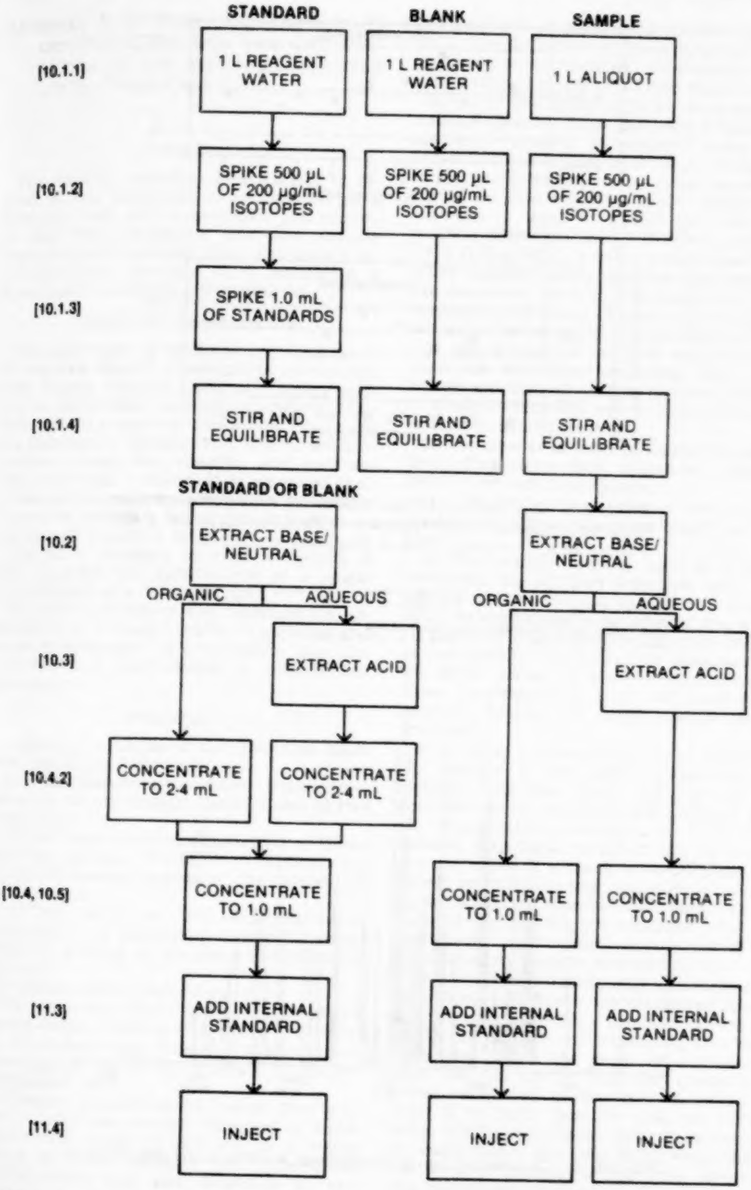
STANDARD
BLANK
SAMPLE
[10.1.1]
1 L REAGENT WATER
1 L REAGENT WATER
1 L ALIQUOT
[10.1.2]
SPIKE 500 µL OF 200 µg/mL ISOTOPES
SPIKE 500 µL OF 200 µg/mL ISOTOPES
SPIKE 500 µL OF 200 µg/mL ISOTOPES
[10.1.3]
SPIKE 1.0 mL OF STANDARDS
[10.1.4]
STIR AND EQUILIBRATE
STIR AND EQUILIBRATE
STIR AND EQUILIBRATE
STANDARD OR BLANK
[10.2]
EXTRACT BASE/ NEUTRAL
EXTRACT BASE/ NEUTRAL
ORGANIC
AQUEOUS
ORGANIC
AQUEOUS
[10.3]
EXTRACT ACID
EXTRACT ACID
[10.4.2]
CONCENTRATE TO 2-4 mL
CONCENTRATE TO 2-4 mL
[10.4, 10.5]
CONCENTRATE TO 1.0 mL
CONCENTRATE TO 1.0 mL
CONCENTRATE TO 1.0 mL
[11.3]
ADD INTERNAL STANDARD
ADD INTERNAL STANDARD
ADD INTERNAL STANDARD
[11.4]
INJECT
INJECT
INJECT

FIGURE 4 Flow Chart for Extraction/Concentration of Precision and Recovery Standard, Blank, and Sample by Method 1625. Numbers in Brackets [ ] Refer to Section Numbers in the Method.

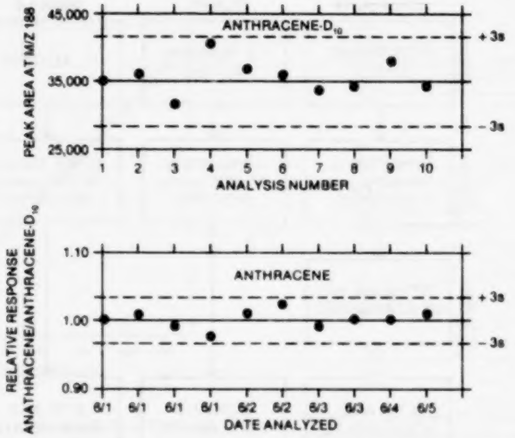

FIGURE 5 Quality Control Charts Showing Area (top graph) and Relative Response of Anthracene to Anthracene-d$_{10}$ (lower graph) Plotted as a Function of Time or Analysis Number.

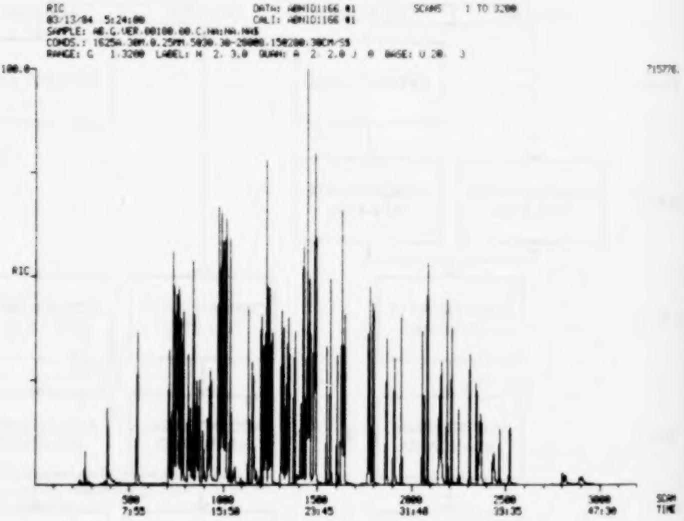

FIGURE 6 Chromatogram of Combined Acid/base/neutral Standard.

[49 FR 43261, Oct. 26, 1984; 50 FR 692, 695, Jan. 4, 1985, as amended at 51 FR 23702, J
30, 1986]

APPENDIX B TO PART 136—DEFINITION AND PROCEDURE FOR THE DETERMINATION OF THE METHOD DETECTION LIMIT—REVISION 1.11

Definition

The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

Scope and Application

This procedure is designed for applicability to a wide variety of sample types ranging from reagent (blank) water containing analyte to wastewater containing analyte. The MDL for an analytical procedure may vary as a function of sample type. The procedure requires a complete, specific, and well defined analytical method. It is essential that all sample processing steps of the analytical method be included in the determination of the method detection limit.

The MDL obtained by this procedure is used to judge the significance of a single measurement of a future sample.

The MDL procedure was designed for applicability to a broad variety of physical and chemical methods. To accomplish this, the procedure was made device- or instrument-independent.

Procedure

1. Make an estimate of the detection limit using one of the following:

(a) The concentration value that corresponds to an instrument signal/noise in the range of 2.5 to 5.

(b) The concentration equivalent of three times the standard deviation of replicate instrumental measurements of the analyte in reagent water.

(c) That region of the standard curve where there is a significant change in sensitivity, i.e., a break in the slope of the standard curve.

(d) Instrumental limitations.

It is recognized that the experience of the analyst is important to this process. However, the analyst must include the above considerations in the initial estimate of the detection limit.

2. Prepare reagent (blank) water that is as free of analyte as possible. Reagent or interference free water is defined as a water sample in which analyte and interferent concentrations are not detected at the method detection limit of each analyte of interest. Interferences are defined as systematic errors in the measured analytical signal of an established procedure caused by the presence of interfering species (interferent). The interferent concentration is presupposed to be normally distributed in representative samples of a given matrix.

3. (a) If the MDL is to be determined in reagent (blank) water, prepare a laboratory standard (analyte in reagent water) at a concentration which is at least equal to or in the same concentration range as the estimated method detection limit. (Recommend between 1 and 5 times the estimated method detection limit.) Proceed to Step 4.

(b) If the MDL is to be determined in another sample matrix, analyze the sample. If the measured level of the analyte is in the recommended range of one to five times the estimated detection limit, proceed to Step 4.

If the measured level of analyte is less than the estimated detection limit, add a known amount of analyte to bring the level of analyte between one and five times the estimated detection limit.

If the measured level of analyte is greater than five times the estimated detection limit, there are two options.

(1) Obtain another sample with a lower level of analyte in the same matrix if possible.

(2) The sample may be used as is for determining the method detection limit if the analyte level does not exceed 10 times the MDL of the analyte in reagent water. The variance of the analytical method changes as the analyte concentration increases from the MDL, hence the MDL determined under these circumstances may not truly reflect method variance at lower analyte concentrations.

4. (a) Take a minimum of seven aliquots of the sample to be used to calculate the method detection limit and process each through the entire analytical method. Make all computations according to the defined method with final results in the method reporting units. If a blank measurement is required to calculate the measured level of analyte, obtain a separate blank measurement for each sample aliquot analyzed. The average blank measurement is subtracted from the respective sample measurements.

(b) It may be economically and technically desirable to evaluate the estimated method detection limit before proceeding with 4a. This will: (1) Prevent repeating this entire procedure when the costs of analyses are high and (2) insure that the procedure is being conducted at the correct concentration. It is quite possible that an inflated MDL will be calculated from data obtained at many times the real MDL even though the level of analyte is less than five times the calculated method detection limit. To insure that the estimate of the method detection limit is a good estimate, it is necessary to determine that a lower concentration of analyte will not result in a significantly lower method detection limit. Take two aliquots of the sample to be used to calculate the method detection limit and process each through the entire method, including blank measurements as described above in 4a. Evaluate these data:

(1) If these measurements indicate the sample is in desirable range for determination of the MDL, take five additional aliquots and proceed. Use all seven measurements for calculation of the MDL.

(2) If these measurements indicate the sample is not in correct range, reestimate the MDL, obtain new sample as in 3 and repeat either 4a or 4b.

5. Calculate the variance (S^2) and standard deviation (S) of the replicate measurements, as follows:

$$S^2 = \frac{1}{n-1}\left[\sum_{i=1}^{n} X_i^2 - \left(\sum_{i=1}^{n} X_i\right)^2 \Big/ n\right]$$

$$S = (S^2)^{1/2}$$

where:

X_i; i=1 to n, are the analytical results in the final method reporting units obtained from the n sample aliquots and Σ refers to the sum of the X values from i=1 to n.

6. (a) Compute the MDL as follows:

$$MDL = t_{(n-1, 1-\alpha = 0.99)} (S)$$

where:

MDL = the method detection limit

$t_{(n-1, 1-\alpha = .99)}$ = the students' t value appropriate for a 99% confidence level and a standard deviation estimate with n-1 degrees of freedom. See Table.

S = standard deviation of the replicate analyses.

(b) The 95% confidence interval estimates for the MDL derived in 6a are computed according to the following equations derived from percentiles of the chi square over degrees of freedom distribution (χ^2/df).

LCL = 0.64 MDL

UCL = 2.20 MDL

where: LCL and UCL are the lower and upper 95% confidence limits respectively based on seven aliquots.

7. Optional iterative procedure to verify the reasonableness of the estimate of the MDL and subsequent MDL determinations.

(a) If this is the initial attempt to compute MDL based on the estimate of MDL formulated in Step 1, take the MDL as calculated in Step 6, spike the matrix at this calculated MDL and proceed through the procedure starting with Step 4.

(b) If this is the second or later iteration of the MDL calculation, use S^2 from the current MDL calculation and S^2 from the previous MDL calculation to compute the F-ratio. The F-ratio is calculated by substituting the larger S^2 into the numerator S^2_A and the other into the denominator S^2_B. The computed F-ratio is then compared with the F-ratio found in the table which is 3.05 as follows: if $S^2_A/S^2_B < 3.05$, then compute the pooled standard deviation by the following equation:

$$S_{pooled} = \left[\frac{6S^2_A + 6S^2_B}{12}\right]^{1/2}$$

if $S^2_A/S^2_B > 3.05$, respike at the most recent calculated MDL and process the sample through the procedure starting with Step 4. If the most recent calculated MDL does not permit qualitative identification when samples are spiked at that level, report the MDL as a concentration between the current and previous MDL which permits qualitative identification.

(c) Use the S_{pooled} as calculated in 7b to compute the final MDL according to the following equation:

$$MDL = 2.681 (S_{pooled})$$

where 2.681 is equal to $t_{(12, 1-\alpha = .99)}$.

(d) The 95% confidence limits for MDL derived in 7c are computed according to the following equations derived from precentiles of the chi squared over degrees of freedom distribution.

LCL=0.72 MDL

UCL=1.65 MDL

where LCL and UCL are the lower and upper 95% confidence limits respectively based on 14 aliquots.

TABLES OF STUDENTS' t VALUES AT THE 99 PERCENT CONFIDENCE LEVEL

Number of replicates	Degrees of freedom (n-1)	$t_{(n-1,}$
7	6	3.14
8	7	2.99
9	8	2.89
10	9	2.82
11	10	2.76
16	15	2.60
21	20	2.52
26	25	2.48
31	30	2.45
61	60	2.39
∞	∞	2.32

Reporting

The analytical method used must be specifically identified by number or title and the MDL for each analyte expressed in the appropriate method reporting units. If the analytical method permits options which affect the method detection limit, these conditions must be specified with the MDL value. The sample matrix used to determine the MDL must also be identified with MDL value. Report the mean analyte level with the MDL and indicate if the MDL procedure was iterated. If a laboratory standard or a sample that contained a known amount analyte was used for this determination, also report the mean recovery.

If the level of analyte in the sample was below the determined MDL or exceeds 10 times the MDL of the analyte in reagent water, do not report a value for the MDL.

[49 FR 43430, Oct. 26, 1984; 50 FR 694, 696, Jan. 4, 1985, as amended at 51 FR 23703, June 30, 1986]

APPENDIX C TO PART 136—INDUCTIVELY COUPLED PLASMA—ATOMIC EMISSION SPECTROMETRIC METHOD FOR TRACE ELEMENT ANALYSIS OF WATER AND WASTES METHOD 200.7

1. Scope and Application

1.1 This method may be used for the determination of dissolved, suspended, or total elements in drinking water, surface water, and domestic and industrial wastewaters.

1.2 Dissolved elements are determined in filtered and acidified samples. Appropriate steps must be taken in all analyses to ensure that potential interferences are taken into account. This is especially true when dissolved solids exceed 1500 mg/L. (See Section 5.)

1.3 Total elements are determined after appropriate digestion procedures are performed. Since digestion techniques increase the dissolved solids content of the samples, appropriate steps must be taken to correct for potential interference effects. (See Section 5.)

1.4 Table 1 lists elements for which this method applies along with recommended wavelengths and typical estimated instrumental detection limits using conventional pneumatic nebulization. Actual working detection limits are sample dependent and as the sample matrix varies, these concentrations may also vary. In time, other elements may be added as more information becomes available and as required.

1.5 Because of the differences between various makes and models of satisfactory instruments, no detailed instrumental operating instructions can be provided. Instead, the analyst is referred to the instruction provided by the manufacturer of the particular instrument.

2. Summary of Method

2.1 The method describes a technique for the simultaneous or sequential multielement determination of trace elements in solution. The basis of the method is the measurement of atomic emission by an optical spectroscopic technique. Samples are nebulized and the aerosol that is produced is transported to the plasma torch where excitation occurs. Characteristic atomic-line emission spectra are produced by a radio-frequency inductively coupled plasma (ICP). The spectra are dispersed by a grating spectrometer and the intensities of the lines are monitored by photomultiplier tubes. The photocurrents from the photomultiplier tubes are processed and controlled by a computer system. A background correction technique is required to compensate for variable background contribution to the determination of trace elements. Background must be measured adjacent to analyte lines on samples during analysis. The position selected for the background intensity measurement, on either or both sides of the analytical line, will be determined by the complexity of the spectrum adjacent to the analyte line. The position used must be free of spectral interference and reflect the same change in background intensity as occurs at the analyte wavelength measured. Background correction is not required in cases of line broadening where a background correction measurement would actually degrade the analytical result. The possibility of additional interferences named in 5.1 (and tests for their presence as described in 5.2) should also be recognized and appropriate corrections made.

3. Definitions

3.1 *Dissolved*—Those elements which will pass through a 0.45 μm membrane filter.

3.2 *Suspended*—Those elements which are retained by a 0.45 μm membrane filter.

3.3 *Total*—The concentration determined on an unfiltered sample following vigorous digestion (Section 9.3), or the sum of the dissolved plus suspended concentrations. (Section 9.1 plus 9.2).

3.4 *Total recoverable*—The concentration determined on an unfiltered sample following treatment with hot, dilute mineral acid (Section 9.4).

3.5 *Instrumental detection limit*—The concentration equivalent to a signal, due to the analyte, which is equal to three times the standard deviation of a series of ten replicate measurements of a reagent blank signal at the same wavelength.

3.6 *Sensitivity*—The slope of the analytical curve, i.e. functional relationship between emission intensity and concentration.

3.7 *Instrument check standard*—A multielement standard of known concentrations prepared by the analyst to monitor and verify instrument performance on a daily basis. (See 7.6.1)

3.8 *Interference check sample*—A solution containing both interfering and analyte elemelts of known concentration that can be used to verify background and interelement correction factors. (See 7.6.2.)

3.9 *Quality control sample*—A solution obtained from an outside source having known, concentration values to be used to verify the calibration standards. (See 7.6.3)

3.10 *Calibration staldards*—A series of known standard solutions used by the analyst for calibration of the instrument (i.e., preparation of the analytical curve). (See 7.4)

3.11 *Linear dynamic range*—The concentration range over which the analytical curve remains linear.

3.12 *Reagent blank*—A volume of deionized, distilled water containing the same acid matrix as the calibration standards carried through the entire analytical scheme. (See 7.5.2)

3.13 *Calibration blank*—A volume of deionized, distilled water acidified with HNO_3 and HCl. (See 7.5.1)

3.14 *Methmd of standard addition*—The standard addition technique involves the use of the unknown and the unknown plus a known amount of standard. (See 10.6.1.)

4. Safety

4.1 The toxicity of carcinogenicity of each reagent used in this method has not been precisely defined; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. The laboratory is repsonsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material data handling sheets should also be made available to all personnel involved in the chemical analysis. Additional references to laboratory safety are available and have been identified (14.7, 14.8 and 14.9) for the information of the analyst.

5. Interferences

5.1 Several types of interference effects may contribute to inaccuracies in the determination of trace elements. They can be summarized as follows:

5.1.1 *Spectral interferences* can be categorized as (1) overlap of a spectral line from another element; (2) unresolved overlap of molecular band spectra; (3) background contribution from continuous or recombination phenomena; and (4) background contribution from stray light from the line emission of high concentration elements. The first of these effects can be compensated by utilizing a computer correction of the raw data, requiring the monitoring and measurement of the interfering element. The second effect may require selection of an alternate wavelength. The third and fourth effects can usually be compensated by a background correction adjacent to the analyte line. In addition, users of simultaneous multi-element instrumentation must assume the responsibility of verifying the absence of spectral interference from an element that could occur in a sample but for which there is no channel in the instrument array. Listed in Table 2 are some interference effects for the recommended wavelengths given in Table 1. The data in Table 2 are intended for use only as a rudimentary guide for the indication of potential spectral interferences. For this purpose, linear relations between concentration and intensity for the analytes and the interferents can be assumed. The Interference information, which was collected at the Ames Laboratory,[1] is expressed as analyte concentration equivalents (i.e. false analyte concentrations) arising from 100 mg/L of the interferent element. The suggested use of this information is as follows: Assume that arsenic (at 193.696 nm) is to be determined in a sample containing approximately 10 mg/L of aluminum. According to Table 2, 100 mg/L of aluminum would yield a false signal for arsenic equivalent to approximately 1.3 mg/L. Therefore, 10 mg/L of aluminum would result in a false signal for arsenic equivalent to approximately 0.13 mg/L. The reader is cautioned that other analytical systems may exhibit somewhat different levels of interference than those shown in Table 2, and that the interference effects must be evaluated for each individual system.

Only those interferents listed were investigated and the blank spaces in Table 2 indicate that measurable interferences were not observed for the interferent concentrations listed in Table 3. Generally, interferences were discernible if they produced peaks or background shifts corresponding to 2-5% of the peaks generated by the analyte concentrations also listed in Table 3.

At present, information on the listed silver and potassium wavelengths are not available but it has been reported that second order energy from the magnesium 383.231 nm wavelength interferes with the listed potassium line at 766.491 nm.

5.1.2 *Physical interferences* are generally considered to be effects associated with the sample nebulization and transport processes. Such properties as change in viscosity and surface tension can cause significant inaccuracies especially in samples which may contain high dissolved solids and/or acid concentrations. The use of a peristaltic pump may lessen these interferences. If these types of interferences are operative, they must be reduced by dilution of the sample and/or utilization of standard addition techniques. Another problem which can occur from high dissolved solids is salt buildup at the tip of the nebulizer. This affects aerosol flow rate causing instrumental drift. Wetting the argon prior to nebulization, the use of a tip washer, or sample dilution have been used to control this problem. Also, it has been reported that better control of the argon flow rate improves instrument performance. This is accomplished with the use of mass flow controllers.

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[1] Ames Laboratory, USDOE, Iowa State University, Ames Iowa 50011.

5.1.3 *Chemical Interferences* are characterized by molecular compound formation, onization effects and solute vaporization effects. Normally these effects are not pronounced with the ICP technique, however, f observed they can be minimized by care- ul selection of operating conditions (that is, ncident power, observation position, and so orth), by buffering of the sample, by natrix matching, and by standard addition rocedures. These types of interferences an be highly dependent on matrix type and he specific analyte element.

5.2 It is recommended that whenever a ew or unusual sample matrix is encoun- ered, a series of tests be performed prior to eporting concentration data for analyte lements. These tests, as outlined in 5.2.1 hrough 5.2.4, will ensure the analyst that either positive nor negative interference ffects are operative on any of the analyte lements thereby distorting the accuracy of he reported values.

5.2.1 *Serial dilution.* If the analyte con- entration is sufficiently high (minimally a actor of 10 above the instrumental detec- on limit after dilution), an analysis of a di- ition should agree within 5 percent of the riginal determination (or within some ac- eptable control limit (14.3) that has been tablished for that matrix.). If not, a chem- al or physical interference effect should e suspected.

5.2.2 *Spike addition.* The recovery of a pike addition added at a minimum level of 0X the instrumental detection limit (maxi- um 100X) to the original determination hould be recovered to within 90 to 110 per- nt or within the established control limit r that matrix. If not, a matrix effect hould be suspected. The use of a standard ddition analysis procedure can usually mpensate for this effect.

Caution: The standard addition technique es not detect coincident spectral overlap. suspected, use of computerized compensa- on, an alternate wavelength, or compari- n with an alternate method is recom- ended (See 5.2.3).

5.2.3 *Comparison with alternate method analysis.* When investigating a new mple matrix, comparison tests may be performed with other analytical techniques such as atomic absorption spectrometry, or other approved methodology.

5.2.4 *Wavelength scanning of analyte line region.* If the appropriate equipment is available, wavelength scanning can be performed to detect potential spectral interferences.

6. Apparatus

6.1 Inductively Coupled Plasma-Atomic Emission Spectrometer.

6.1.1 Computer controlled atomic emission spectrometer with background correction.

6.1.2 Radiofrequency generator.

6.1.3 Argon gas supply, welding grade or better.

6.2 Operating conditions—Because of the differences between various makes and models of satisfactory instruments, no detailed operating instructions can be provided. Instead, the analyst should follow the instructions provided by the manufacturer of the particular instrument. Sensitivity, instrumental detection limit, precision, linear dynamic range, and interference effects must be investigated and established for each individual analyte line on that particular instrument. It is the responsibility of the analyst to verify that the instrument configuration and operating conditions used satisfy the analytical requirements and to maintain quality control data confirming instrument performance and analytical results.

7. Reagents and Standards

7.1 Acids used in the preparation of standards and for sample processing must be ultra-high purity grade or equivalent. Redistilled acids are acceptable.

7.1.1 *Acetic acid,* conc. (sp gr 1.06).

7.1.2 *Hydrochloric acid,* conc. (sp gr 1.19).

7.1.3 *Hydrochloric acid,* (1+1): Add 500 mL conc. HCl (sp gr 1.19) to 400 mL deionized, distilled water and dilute to 1 liter.

7.1.4 *Nitric acid,* conc. (sp gr 1.41).

7.1.5 *Nitric acid,* (1+1): Add 500 mL conc. HNO_3 (sp gr 1.41) to 400 mL deionized, distilled water and dilute to 1 liter.

7.2 *Deionized, distilled water:* Prepare by passing distilled water through a mixed bed of cation and anion exchange resins. Use deionized, distilled water for the preparation of all reagents, calibration standards and as dilution water. The purity of this water must be equivalent to ASTM Type II reagent water of Specification D 1193 (14.6).

7.3 *Standard stock solutions* may be purchased or prepared from ultra high purity grade chemicals or metals. All salts must be dried for 1 h at 105 °C unless otherwise specified.

(CAUTION: Many metal salts are extremely toxic and may be fatal if swallowed. Wash hands thoroughly after handling.)

Typical stock solution preparation procedures follow:

7.3.1 *Aluminum solution, stock,* 1 mL=100μg Al: Dissolve 0.100 g of aluminum metal in an acid mixture of 4 mL of (1+1) HCl and 1 mL of conc. HNO_3 in a beaker. Warm gently to effect solution. When solution is complete, transfer quantitatively to a liter flask add an additional 10 mL of (1+1) HCl and dilute to 1,000 mL with deionized, distilled water.

7.3.2 *Antimony solution stock,* 1 mL=100 μg Sb: Dissolve 0.2669 g $K(SbO)C_4H_4O_6$ in deionized distilled water, add 10 mL (1+1) HCl and dilute to 1,000 mL with deionized, distilled water.

7.3.3 *Arsenic solution, stock,* 1 mL=100 μg As: Dissolve 0.1320 g of As_2O_3 in 100 mL of deionized, distilled water containing 0.4 g NaOH. Acidify the solution with 2 mL conc. HNO_3 and dilute to 1,000 mL with deionized, distilled water.

7.3.4 *Barium solution, stock,* 1 mL=100 μg Ba: Dissolve 0.1516 g $BaCl_2$ (dried at 250 °C for 2 hrs) in 10 mL deionized, distilled water with 1 mL (1+1) HCl. Add 10.0 mL (1+1) HCl and dilute to 1,000 with mL deionized, distilled water.

7.3.5 *Beryllium solution, stock,* 1 mL=100 μg Be: *Do not dry.* Dissolve 1.966 g $BeSO_4 \cdot 4H_2O$, in deionized, distilled water, add 10.0 mL conc. HNO_3 and dilute to 1,000 mL with deionized, distilled water.

7.3.6 *Boron solution, stock,* 1 mL=100 μg B: *Do not dry.* Dissolve 0.5716 g anhydrous H_3BO_3 in deionized, distilled water and dilute to 1,000 mL. Use a reagent meeting ACS specifications, keep the bottle tightly stoppered and store in a desiccator to prevent the entrance of atmospheric moisture.

7.3.7 *Cadmium solution, stock,* 1 mL=100 μg Cd: Dissolve 0.1142 g CdO in a minimum amount of (1+1) HNO_3. Heat to increase rate of dissolution. Add 10.0 mL conc. HNO_3 and dilute to 1,000 mL with deionized, distilled water.

7.3.8 *Calcium solution, stock,* 1 mL=100 μg Ca: Suspend 0.2498 g $CaCO_3$ dried at 180 °C for 1 h before weighing in deionized, distilled water and dissolve cautiously with a minimum amount of (1+1) HNO_3. Add 10.0 mL conc. HNO_3 and dilute to 1,000 mL with deionized, distilled water.

7.3.9 *Chromium solution, stock,* 1 mL=100 μg Cr: Dissolve 0.1923 g of CrO_3 in deionized, distilled water. When solution is complete, acidify with 10 mL conc. HNO_3 and dilute to 1,000 mL with deionized, distilled water.

7.3.10 *Cobalt solution, stock,* 1 mL=100 μg Co: Dissolve 0.1000 g of cobalt metal in a minimum amount of (1+1) HNO_3. Add 10.0 mL (1+1) HCl and dilute to 1,000 mL with deionized, distilled water.

7.3.11 *Copper solution, stock,* 1 mL=100 μg Cu: Dissolve 0.1252 g CuO in a minimum amount of (1+1) HNO_3. Add 10.0 mL conc. HNO_3 and dilute to 1,000 mL with deionized, distilled water.

7.3.12 *Iron solution, stock,* 1 mL=100 μg Fe: Dissolve 0.1430 g Fe_2O_3 in a warm mixture of 20 mL (1+1) HCl and 2 mL of conc. HNO_3. Cool, add an additional 5 mL of conc. HNO_3 and dilute to 1,000 mL with deionized, distilled water.

7.3.13 *Lead solution, stock,* 1 mL=100 μg Pb: Dissolve 0.1599 g $Pb(NO_3)_2$ in a minimum amount of (1+1) HNO_3. Add 10.0 mL conc. HNO_3 and dilute to 1,000 mL with deionized, distilled water.

7.3.14 *Magnesium solution, stock,* 1 mL=100 μg Mg: Dissolve 0.1658 g MgO in a minimum amount of (1+1) HNO_3. Add 10.0 mL conc. HNO_3 and dilute to 1,000 mL with deionized, distilled water.

7.3.15 *Manganese solution, stock,* 1 mL=100 μg Mn: Dissolve 0.1000 g of manganese metal in the acid mixture 10 mL conc. HCl and 1 mL conc. HNO_3, and dilute to 1,000 mL with deionized, distilled water.

7.3.16 *Molybdenum solution, stock,* 1 mL=100 μg Mo: Dissolve 0.2043 g $(NH_4)_2MoO_4$ in deionized, distilled water and dilute to 1,000 mL.

7.3.17 *Nickel solution, stock,* 1 mL=100 μg Ni: Dissolve 0.1000 g of nickel metal in 10 mL hot conc. HNO_3, cool and dilute to 1,000 mL with deionized, distilled water.

7.3.18 *Potassium solution, stock,* 1 mL=100 μg K: Dissolve 0.1907 g KCl, dried at 110 °C, in deionized, distilled water and dilute to 1,000 mL.

7.3.19 *Selenium solution, stock,* 1 mL=100 μg Se: *Do not dry.* Dissolve 0.1727 g H_2SeO_3 (actual assay 94.6%) in deionized distilled water and dilute to 1,000 mL.

7.3.20 *Silica solution, stock,* 1 mL=100 μg SiO_2: *Do not dry.* Dissolve 0.4730 g $Na_2SiO_3 \cdot 9H_2O$ in deionized, distilled water. Add 10.0 mL conc. HNO_3 and dilute to 1,000 mL with deionized, distilled water.

7.3.21 *Silver solution, stock,* 1 mL=100 μg Ag: Dissolve 0.1575 g $AgNO_3$ in 100 mL of deionized, distilled water and 10 mL conc. HNO_3. Dilute to 1,000 mL with deionized distilled water.

7.3.22 *Sodium solution, stock,* 1 mL=100 μg Na: Dissolve 0.2542 g NaCl in deionized distilled water. Add 10.0 mL conc. HNO_3 and dilute to 1,000 mL with deionized, distilled water.

7.3.23 *Thallium solution, stock,* 1 mL=100 μg Tl: Dissolve 0.1303 g $TlNO_3$ in deionized, distilled water. Add 10.0 mL conc. HNO_3 and dilute to 1,000 mL with deionized distilled water.

7.3.24 *Vanadium solution, stock,* 1 mL=100 μg V: Dissolve 0.2297 NH_4VO_3 in a minimum amount of conc. HNO_3. Heat to increase rate of dissolution. Add 10.0 mL

HNO₃ and dilute to 1,000 mL with
ized, distilled water.

25 *Zinc solution, stock,* 1 mL=100 µg
Dissolve 0.1245 g ZnO in a minimum
nt of dilute HNO_3. Add 10.0 mL conc.
, and dilute to 1,000 mL deionized, dis-
water.

Mixed calibration standard solu-
–Prepare mixed calibration standard
ons by combining appropriate volumes
e stock solutions in volumetric flasks.
7.4.1 thru 7.4.5) Add 2 mL of (1+1)
and 10 mL of (1+1) HC1 and dilute to
L with deionized, distilled water. (See
1 and 6.) Prior to preparing the mixed
ards, each stock solution should be
ed separately to determine possible
al interference or the presence of im-
es. Care should be taken when prepar-
e mixed standards that the elemelts
mpatible and stable. Transfer the
standard solutions to a FEP fluoro-
or unused polyethylene bottle for
e. Fresh mixed standards should be
ed as needed with the realization that
tration can change on aging. Calibra-
tandards must be initially verified
a quality control sample and moni-
weekly for stability (See 7.6.3). Al-
not specifically required, some typi-
bration standard combinations follow
sing those specific wavelengths listed
e 1.

Mixed standard solution I—Manga-
eryllium, cadmium, lead, and zinc.

Mixed standard solution II—
, copper, iron, vanadium, and cobalt.

Mixed standard solution III—Mo-
m, silica, arsenic, and selenium.

Mixed standard solution IV—Calci-
lium, potassium, aluminum, chromi-
nickel.

Mixed standard solution V—Anti-
oron, magnesium, silver, and thalli-

1. If the addition of silver to the
ended acid combination results in
l precipitation, add 15 mL of deion-
illed water and warm the flask until
tion clears. Cool and dilute to 100
deionized, distilled water. For this
nbination the silver concentration
e limited to 2 mg/L. Silver under
nditions is stable in a tap water
or 30 days. Higher concentrations of
quire additional HCl.

wo types of blanks are required for
ysis. The calibration blank (3.13) is
establishing the analytical curve
e reagent blank (3.12) is used to cor-
possible contamination resulting
ying amounts of the acids used in
le processing.

The calibration blank is prepared
g 2 mL of (1+1) HNO_3 and 10 mL
HCl to 100 mL with deionized, distilled water. (See Note 6.) Prepare a sufficient quantity to be used to flush the system between standards and samples.

7.5.2 *The reagent blank* must contain all the reagents and in the same volumes as used in the processing of the samples. The reagent blank must be carried through the complete procedure and contain the same acid concentration in the final solution as the sample solution used for analysis.

7.6 In addition to the calibration standards, an instrument check standard (3.7), an interference check sample (3.8) and a quality control sample (3.9) are also required for the analyses.

7.6.1 The *instrument check standard* is prepared by the analyst by combining compatible elements at a concentration equivalent to the midpoint of their respective calibration curves. (See 12.1.1.)

7.6.2 The *interference check sample* is prepared by the analyst in the following manner. Select a representative sample which contains minimal concentrations of the analytes of interest but known concentration of interfering elements that will provide an adequate test of the correction factors. Spike the sample with the elements of interest at the approximate concentration of either 100 µg/L or 5 times the estimated detection limits given in Table 1. (For effluent samples of expected high concentrations, spike at an appropriate level.) If the type of samples analyzed are varied, a synthetically prepared sample may be used if the above criteria and intent are met.

7.6.3 The *quality control sample* should be prepared in the same acid matrix as the calibration standards at a concentration near 1 mg/L and in accordance with the instructions provided by the supplier. The Quality Assurance Branch of EMSL-Cincinnati will either supply a quality control sample or information where one of equal quality can be procured. (See 12.1.3.)

8. Sample Handling and Preservation

8.1 For the determination of trace elements, contamination and loss are of prime concern. Dust in the laboratory environment, impurities in reagents and impurities on laboratory apparatus which the sample contacts are all sources of potential contamination. Sample containers can introduce either positive or negative errors in the measurement of trace elements by (a) contributing contaminants through leaching or surface desorption and (b) by depleting concentrations through adsorption. Thus the collection and treatment of the sample prior to analysis requires particular attention. Laboratory glassware including the sample bottle (whether polyethylene, polypropylene or FEP-fluorocarbon) should be thoroughly washed with detergent and tap water; rinsed with (1+1) nitric acid, tap water, (1+1) hydrochloric acid, tap and finally deionized, distilled water in that order (See Notes 2 and 3).

NOTE: 2. Chromic acid may be useful to remove organic deposits from glassware; however, the analyst should be cautioned that the glassware must be thoroughly rinsed with water to remove the last traces of chromium. This is especially important if chromium is to be included in the analytical scheme. A commercial product, NOCHROMIX, available from Godax Laboratories, 6 Varick St., New York, NY 10013, may be used in place of chromic acid. Chromic acid should not be used with plastic bottles.

NOTE: 3. If it can be documented through an active analytical quality control program using spiked samples and reagent blanks, that certain steps in the cleaning procedure are not required for routine samples, those steps may be eliminated from the procedure.

8.2 Before collection of the sample a decision must be made as to the type of data desired, that is dissolved, suspended or total, so that the appropriate preservation and pretreatment steps may be accomplished. Filtration, acid preservation, etc., are to be performed at the time the sample is collected or as soon as possible thereafter.

8.2.1 For the determination of dissolved elements the sample must be filtered through a 0.45-μm membrane filter as soon as practical after collection. (Glass or plastic filtering apparatus are recommended to avoid possible contamination.) Use the first 50-100 mL to rinse the filter flask. Discard this portion and collect the required volume of filtrate. Acidify the filtrate with (1+1) HNO_3 to a pH of 2 or less. Normally, 3 mL of (1+1) acid per liter should be sufficient to preserve the sample.

8.2.2 For the determination of suspended elements a measured volume of unpreserved sample must be filtered through a 0.45-μm membrane filter as soon as practical after collection. The filter plus suspended material should be transferred to a suitable container for storage and/or shipment. No preservative is required.

8.2.3 For the determination of total or total recoverable elements, the sample is acidified with (1+1) HNO_3 to pH 2 or less as soon as possible, preferably at the time of collection. The sample is not filtered before processing.

9. Sample Preparation

9.1 For the determinations of dissolved elements, the filtered, preserved sample may often be analyzed as received. The acid matrix and concentration of the samples and calibration standards must be the same. (See Note 6.) If a precipitate formed upon acidification of the sample or during transit or storage, it must be redissolved before the analysis by adding additional acid and/or b heat as described in 9.3.

9.2 For the determination of suspende elements, transfer the membrane filter co taining the insoluble material to a 150-ml Griffin beaker and add 4 mL conc. HNO Cover the beaker with a watch glass a heat gently. The warm acid will soon d solve the membrane. Increase the tempe ture of the hot plate and digest the mate al. When the acid has nearly evaporate cool the beaker and watch glass and add a other 3 mL of conc. HNO_3. Cover and co tinue heating until the digestion is co plete, generally indicated by a light color digestate. Evaporate to near dryness (2 m cool, and 10 mL HCl (1+1) and 15 mL deio ized, distilled water per 100 mL dilution a warm the beaker gently for 15 min. to d solve any precipitated or residue materi Allow to cool, wash down the watch gla and beaker walls with deionized distille water and filter the sample to remove ins uble material that could clog the nebulize (See Note 4.) Adjust the volume based o the expected concentrations of eleme present. This volume will vary depending o the elements to be determined (See Note 5 The sample is now ready for analysis. Co centrations so determined shall be reporte as "suspended."

NOTE: 4. In place of filtering, the samp after diluting and mixing may be cent fuged or allowed to settle by gravity ove night to remove insoluble material.

9.3 For the determination of total e ments, choose a measured volume of th well mixed acid preserved sample approp ate for the expected level of elements a transfer to a Griffin beaker. (See Note 5 Add 3 mL of conc. HNO_3. Place the beak on a hot plate and evaporate to near dr ness cautiously, making certain that th sample does not boil and that no area of th bottom of the beaker is allowed to go dr Cool the beaker and add another 5 mL po tion of conc. HNO_3. Cover the beaker wit watch glass and return to the hot plate. I crease the temperature of the hot plate s that a gently reflux action occurs. Contin heating, adding additional acid as necess until the digestion is complete (generally i dicated when the digestate is light in co or does not change in appearance with co tinued refluxing.) Again, evaporate to n dryness and cool the beaker. Add 10 mL 1+1 HCl and 15 mL of deionized, disti water per 100 mL of final solution and wa the beaker gently for 15 min. to dissolve a precipitate or residue resulting from eva ration. Allow to cool, wash down the bea walls and watch glass with deionized d tilled water and filter the sample to rem insoluble material that could clog the ne lizer. (See Note 4.) Adjust the sample to edetermined volume based on the expect- concentrations of elements present. The nple is now ready for analysis (See Note Concentrations so determined shall be orted as "total."

Note 5. If low determinations of boron critical, quartz glassware should be used.

Note 6. If the sample analysis solution a different acid concentration from that en in 9.4, but does not introduce a physi- interference or affect the analytical ult, the same calibration standards may used.

4 For the determination of total recov- ble elements, choose a measured volume well mixed, acid preserved sample ap- priate for the expected level of elements transfer to a Griffin beaker. (See Note Add 2 mL of (1+1) HNO_3 and 10 mL of 1) HCl to the sample and heat on a m bath or hot plate until the volume been reduced to near 25 mL making cer- the sample does not boil. After this tment, cool the sample and filter to ove insoluble material that could clog nebulizer. (See Note 4.) Adjust the me to 100 mL and mix. The sample is ready for analysis. Concentrations so rmined shall be reported as "total."

10. Procedure

.1 Set up instrument with proper oper- g parameters established in Section 6.2. instrument must be allowed to become mally stable before beginning. This usu- requires at least 30 min. of operation to calibration.

2 Initiate appropriate operating con- ration of computer.

3 Profile and calibrate instrument ac- ing to instrument manufacturer's rec- ended procedures, using the typical d calibration standard solutions de- ed in Section 7.4. Flush the system the calibration blank (7.5.1) between standard. (See Note 7.) (The use of the ge intensity of multiple exposures for standardization and sample analysis een found to reduce random error.)

TE 7. For boron concentrations greater 500 µg/L extended flush times of 1 to 2 tes may be required.

Before beginning the sample run, re- ze the highest mixed calibration stand- s if it were a sample. Concentration s obtained should not deviate from the l values by more than ±5 percent (or stablished control limits whichever is). If they do, follow the recommenda- of the instrument manufacturer to ct for this condition.

Begin the sample run flushing the n with the calibration blank solution between each sample. (See Note 7.) ze the instrument check standard (7.6.1) and the calibration blank (7.5.1) each 10 samples.

10.6 If it has been found that methods of standard addition are required, the following procedure is recommended.

10.6.1 The standard addition technique (14.2) involves preparing new standards in the sample matrix by adding known amounts of standard to one or more aliquots of the processed sample solution. This technique compensates for a sample constituent that enhances or depresses the analyte signal thus producing a different slope from that of the calibration standards. It will not correct for additive interference which causes a baseline shift. The simplest version of this technique is the single-addition method. The procedure is as follows. Two identical aliquots of the sample solution, each of volume V_x, are taken. To the first (labeled A) is added a small volume V_s of a standard analyte solution of concentration c_s. To the second (labeled B) is added the same volume V_s of the solvent. The analytical signals of A and B are measured and corrected for nonanalyte signals. The unknown sample concentration c_x is calculated:

$$c_x = \frac{S_B V_s c_s}{(S_A - S_B)\ V_x}$$

where S_A and S_B are the analytical signals (corrected for the blank) of solutions A and B, respectively. V_s and c_s should be chosen so that S_A is roughly twice S_B on the average. It is best if V_s is made much less than V_x, and thus c_s is much greater than c_x, to avoid excess dilution of the sample matrix. If a separation or concentration step is used, the additions are best made first and carried through the entire procedure. For the results from this technique to be valid, the following limitations must be taken into consideration:

1. The analytical curve must be linear.
2. The chemical form of the analyte added must respond the same as the analyte in the sample.
3. The interference effect must be constant over the working range of concern.
4. The signal must be corrected for any additive interference.

11. Calculation

11.1 Reagent blanks (7.5.2) should be subtracted from all samples. This is particularly important for digested samples requiring large quantities of acids to complete the digestion.

11.2 If dilutions were performed, the appropriate factor must be applied to sample values.

11.3 Data should be rounded to the thousandth place and all results should be reported in mg/L up to three significant figures.

12. *Quality Control (Instrumental)*

12.1 Check the instrument standardization by analyzing appropriate quality control check standards as follow:

12.1.1 Analyze and appropriate instrument check standard (7.6.1) containing the elements of interest at a frequency of 10%. This check standard is used to determine instrument drift. If agreement is not within ±5% of the expected values or within the established control limits, whichever is lower, the analysis is out of control. The analysis should be terminated, the problem corrected, and the instrument recalibrated.

Analyze the calibration blank (7.5.1) at a frequency of 10%. The result should be within the established control limits of 2 standard deviations of the meal value. If not, repeat the analysis two more times and average the three results. If the average is not within the control limit, terminate the analysis, correct the problem and recalibrate the instrument.

12.1.2 To verify interelement and background correction factors analyze the interference check sample (7.6.2) at the beginning, end, and at periodic intervals throughout the sample run. Results should fall within the established control limits of 1.5 times the standard deviation of the mean value. If not, terminate the analysis, correct the problem and recalibrate the instrument.

12.1.3 A quality control sample (7.6.3) obtained from an outside source must first be used for the initial verification of the calibration standards. A fresh dilution of this sample shall be analyzed every week thereafter to monitor their stability. If the results are not within ±5% of the true value listed for the control sample, prepare a new calibration standard and recalibrate the instrument. If this does not correct the problem, prepare a new stock standard and a new calibration standard and repeat the calibration.

13. *Precision and Accuracy*

13.1 In an EPA round robin phase 1 study, even laboratories applied the ICP technique to acid-distilled water matrices that had been dosed with various metal concentrates. Table 4 lists the true value, the mean reported value and the mean % relative standard deviation.

14. *References*

14.1 Winge, R.K., V.J. Peterson, and V.A. Fassel, "Inductively Coupled Plasma-Atomic Emission Spectroscopy: Prominent Lines, EPA-600/4-79-017.

14.2 Winefordner, J.D., "Trace Analysis: Spectroscopic Methods for Elements," *Chemical Analysis*, Vol. *46*, pp. 41-42.

14.3 Handbook for Analytical Quality Control in Water and Wastewater Laboratories, EPA-600/4-79-019.

14.4 Garbarino, J.R. and Taylor, H.E. "An Inductively-Coupled Plasma Atomic Emission Spectrometric Method for Routine Water Quality Testing," Applied Spectroscopy *33*, No. 3 (1979).

14.5 "Methods for Chemical Analysis of Water and Wastes," EPA-600/4-79-020.

14.6 Annual Book of ASTM Standards, Part 31.

14.7 "Carcinogens—Working With Carcinogens," Department of Health, Education, and Welfare, Public Health Service, Center for Disease Control, National Institute for Occupational Safety and Health, Publication No. 77-206, August 1977.

14.8 "OSHA Safety and Health Standards, General Industry," (29 CFR Part 1910), Occupational Safety and Health Administration, OSHA 2206, (Revised, January 1976).

14.9 "Safety in Academic Chemistry Laboratories, American Chemical Society Publication, Committee on Chemical Safety, 3rd Edition, 1979.

TABLE 1.—RECOMMENDED WAVELENGTHS[1] AND ESTIMATED INSTRUMENTAL DETECTIO LIMITS

Element	Wavelength, nm	Estimat detectio lmt, μg/L[2]
Aluminum	308.215	[illegible]
Arsenic	193.696	[illegible]
Antimony	206.833	[illegible]
Barium	455.403	[illegible]
Beryllium	313.042	[illegible]
Boron	249.773	[illegible]
Cadmium	226.502	[illegible]
Calcium	317.933	[illegible]
Chromium	267.716	[illegible]
Cobalt	228.616	[illegible]
Copper	324.754	[illegible]
Iron	259.940	[illegible]
Lead	220.353	[illegible]
Magnesium	279.079	[illegible]
Manganese	257.610	[illegible]
Molybdenum	202.030	[illegible]
Nickel	231.604	[illegible]
Potassium	766.491	[illegible]
Selenium	196.026	[illegible]
Silica (SiO_2)	288.158	[illegible]
Silver	328.068	[illegible]
Sodium	588.995	[illegible]
Thallium	190.864	[illegible]
Vanadium	292.402	[illegible]
Zinc	213.856	[illegible]

[1] The wavelengths listed are recommended becaus their sensitivity and overall acceptance. Other waveleng may be substituted if they can provide the needed sensi and are treated with the same corrective techniqu spectral interference. (See 5.1.1).

[2] The estimated instrumental detection limits as shown taken from "Inductively Coupled Plasma-Atomic Emi Spectroscopy-Prominent Lines," EPA-600/4-79-017. Th

re given as a guide for an instrumental limit. The actual nethod detection limits are sample dependent and may vary s the sample matrix varies.

[3] Highly dependent on operating conditions and plasma position.

TABLE 1.—ANALYTE CONCENTRATION EQUIVALENTS (MG/L) ARISING FROM INTERFERENTS AT THE 100 MG/L LEVEL

Analyte	Wave-length, nm	Interferent—									
		A1	Ca	Cr	Cu	Fe	Mg	Mn	Ni	Ti	V
Aluminum	308.214							0.21			1.4
Antimony	206.833	0.47		2.9		0.08				0.25	0.45
Arsenic	193.696	1.3		0.44							1.1
Barium	455.403										
Beryllium	313.042									0.04	0.05
Boron	249.773	0.04				0.32					
Cadmium	226.502					0.03			0.02		
Calcium	317.933			0.08		0.01	0.01	0.04		0.03	0.03
Chromium	267.716					0.003		0.04			0.04
Cobalt	228.616			0.03		0.005			0.03	0.15	
Copper	324.754					0.003				0.05	0.02
Iron	259.940							0.12			
Lead	220.353	0.17									
Magnesium	279.079		0.02	0.11		0.13		0.25		0.07	0.12
Manganese	257.610	0.005		0.01		0.002	0.002				
Molybdenum	202.030	0.05				0.03					
Nickel	231.604										
Selenium	196.026	0.23				0.09					
Silicon	288.158			0.07							0.01
Sodium	588.995									0.08	
Thallium	190.864	0.30									
Vanadium	292.402			0.05		0.005				0.02	
Zinc	213.856				0.14				0.29		

TABLE 3. INTERFERENT AND ANALYTE ELEMENTAL CONCENTRATIONS USED FOR INTERFERENCE MEASUREMELTS IN TABLE 2

Analytes	(mg/L)	Interferents	(mg/L)
Al	10	Al	1,000
AS	10	Ca	1,000
B	10	Cr	200
Ba	1	Cu	200
Be	1	Fe	1,000
Ca	1	Mg	1,000
Cd	10	Mn	200
Co	1	Ni	200
Cr	1	Ti	200
Cu	1	V	200
Fe	1		
Mg	1		
Mn	1		
Mo	10		
Na	10		
Ni	10		
Pb	10		
Sb	10		
Se	10		
Si	1		
Tl	10		
V	1		
Zn	10		

TABLE 4.—ICP PRECISION AND ACCURACY DATA

Element	Sample No. 1			Sample No. 2			Sample No. 3		
	True value µg/L	Mean reported value µg/L	Mean percent RSD	True value µg/L	Mean reported value µg/L	Mean percent RSD	True value µg/L	Mean reported value µg/L	Mean percent RSD
Be	750	733	6.2	20	20	9.8	180	176	5.2
Mn	350	345	2.7	15	15	6.7	100	99	3.3
V	750	749	1.8	70	69	2.9	170	169	1.1
As	200	208	7.5	22	19	23	60	63	17
Cr	150	149	3.8	10	10	18	50	50	3.3
Cu	250	235	5.1	11	11	40	70	67	7.9
Fe	600	594	3.0	20	19	15	180	178	6.0
Al	700	696	5.6	60	62	33	160	161	13
Cd	50	48	12	2.5	2.9	16	14 †D13	16	
Co	500	512	10	20	20	4.1	120	108	21
Ni	250	245	5.8	30	28	11	60	55	14
Pb	250	236	16	24	30	32	80	80	14
Zn	200	201	5.6	16	19	45	80	82	9.4
Se	40	32	21.9	6	8.5	42	10	8.5	8.3

Not all elements were analyzed by all laboratories.

[49 FR 43431, Oct. 26, 1984; 50 FR 695, 696, Jan. 4, 1985, as amended at 51 FR 23703, June 30, 1986]

PART 140—MARINE SANITATION DEVICE STANDARD

Sec.
140.1 Definitions.
140.2 Scope of standard.
140.3 Standard.
140.4 Complete prohibition.
140.5 Analytical procedures.

AUTHORITY: Sec. 312, as added Oct. 18, 1972, Pub. L. 92-500, sec. 2, 86 Stat. 871. Interpret or apply sec. 312(b)(1), 33 U.S.C. 1322 (b)(1).

SOURCE: 41 FR 4453, Jan. 29, 1976, unless otherwise noted.

§ 140.1 Definitions.

For the purpose of these standards the following definitions shall apply:

(a) "Sewage" means human body wastes and the wastes from toilets and other receptacles intended to receive or retain body wastes;

(b) "Discharge" includes, but is not limited to, any spilling, leaking, pumping, pouring, emitting, emptying, or dumping;

(c) "Marine sanitation device" includes any equipment for installation onboard a vessel and which is designed to receive, retain, treat, or discharge sewage and any process to treat such sewage;

(d) "Vessel" includes every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on waters of the United States;

(e) "New vessel" refers to any vessel on which construction was initiated on or after January 30, 1975;

(f) "Existing vessel" refers to any vessel on which construction was initiated before January 30, 1975;

(g) "Fecal coliform bacteria" are those organisms associated with the intestines of warm-blooded animals that are commonly used to indicate the presence of fecal material and the potential presence of organisms capable of causing human disease.

§ 140.2 Scope of standard.

The standard adopted herein applies only to vessels on which a marine sanitation device has been installed. The standard does not require the installation of a marine sanitation device on any vessel that is not so equipped. The standard applies to vessels owned and operated by the United States unless the Secretary of Defense finds that compliance would not be in the interest of national security.

§ 140.3 Standard.

(a) (1) In freshwater lakes, freshwater reservoirs or other freshwater impoundments whose inlets or outlets are such as to prevent the ingress or egress by vessel traffic subject to this regulation, or in rivers not capable of navigation by interstate vessel traffic subject to this regulation, marine sanitation devices certified by the U.S. Coast Guard (see 33 CFR Part 159, published in 40 FR 4622, January 30, 1975), installed on all vessels shall be designed and operated to prevent the overboard discharge of sewage, treated or untreated, or of any waste derived from sewage. This shall not be construed to prohibit the carriage of Coast Guard-certified flow-through treatment devices which have been secured so as to prevent such discharges.

(2) In all other waters, Coast Guard-certified marine sanitation devices installed on all vessels shall be designed and operated to either retain, dispose of, or discharge sewage. If the device has a discharge, subject to paragraph (d) of this section, the effluent shall not have a fecal coliform bacterial count of greater than 1,000 per 100 milliliters nor visible floating solids. Waters where a Coast Guard-certified marine sanitation device permitting discharge is allowed include coastal waters and estuaries, the Great Lakes and inter-connected waterways, freshwater lakes and impoundments accessible through locks, and other flowing waters that are navigable interstate by vessels subject to this regulation.

(b) This standard shall become effective on January 30, 1977 for new vessels and on January 30, 1980 for existing vessels (or, in the case of vessels owned and operated by the Department of Defense, two years and five years, for new and existing vessels, respectively, after promulgation of implementing regulations by the Secretary of Defense under section 312(d) of the Act).

(c) Any vessel which is equipped as of the date of promulgation of this regulation with a Coast Guard-certified flow-through marine sanitation device meeting the requirements of paragraph (a)(2) of this section, shall not be required to comply with the provisions designed to prevent the overboard discharge of sewage, treated or untreated, in paragraph (a)(1) of this section, for the operable life of that device.

(d) After January 30, 1980, subject to paragraphs (e) and (f) of this section, marine sanitation devices on all vessels on waters that are not subject to a prohibition of the overboard discharge of sewage, treated or untreated, as specified in paragraph (a)(1) of this section, shall be designed and operated to either retain, dispose of, or discharge sewage, and shall be certified by the U.S. Coast Guard. If the device has a discharge, the effluent shall not have a fecal coliform bacterial count of greater than 200 per 100 milliliters, nor suspended solids greater than 150 mg/1.

(e) Any existing vessel on waters not subject to a prohibition of the overboard discharge of sewage in paragraph (a)(1) of this section, and which is equipped with a certified device on or before January 30, 1978, shall not be required to comply with paragraph (d) of this section, for the operable life of that device.

(f) Any new vessel on waters not subject to the prohibition of the overboard discharge of sewage in paragraph (a)(1) of this section, and on which construction is initiated before January 31, 1980, which is equipped with a marine sanitation device before January 31, 1980, certified under paragraph (a)(2) of this section, shall not be required to comply with paragraph (d) of this section, for the operable life of that device.

(g) The degrees of treatment described in paragraphs (a) and (d) of this section are "appropriate standards" for purposes of Coast Guard and Department of Defense certification pursuant to section 312(g)(2) of the Act.

(h) This section is not to be construed to accelerate the effective date of the standards and regulations promulgated under section 312 as such date affects the sales regulations for marine sanitation devices specified in section 312(g)(1): January 30, 1977, and January 30, 1980, for new and existing vessels, respectively.

§ 140.4 Complete prohibition.

(a) A State may completely prohibit the discharge from all vessels of any sewage, whether treated or not, into some or all of the waters within such State by making a written application to the Administrator, Environmental Protection Agency, and by receiving the Administrator's affirmative determination pursuant to section 312(f)(3) of the Act. Upon receipt of an application under section 312(f)(3) of the Act, the Administrator will determine within 90 days whether adequate facilities for the safe and sanitary removal and treatment of sewage from all vessels using such waters are reasonably available. Applications made by States pursuant to section 312(f)(3) of the Act shall include:

(1) A certification that the protection and enhancement of the waters described in the petition require greater environmental protection than the applicable Federal standard;

(2) A map showing the location of commercial and recreational pump-out facilities;

(3) A description of the location of pump-out facilities within waters designated for no discharge;

(4) The general schedule of operating hours of the pump-out facilities;

(5) The draught requirements on vessels that may be excluded because of insufficient water depth adjacent to the facility;

(6) Information indicating that treatment of wastes from such pump-out facilities is in conformance with Federal law; and

(7) Information on vessel population and vessel usage of the subject waters.

(b) A State may make a written application to the Administrator, Environmental Protection Agency, under section 312(f)(4) of the Act, for the issuance of a regulation completely prohibiting discharge from a vessel of any sewage, whether treated or not, into particular waters of the United States or specified portions thereof, which waters are located within the boundaries of such State. Such application shall specify with particularly the waters, or portions thereof, for which a complete prohibition is desired. The application shall include identification of water recreational areas, drinking water intakes, aquatic sanctuaries, identifiable fish-spawning and nursery areas, and areas of intensive boating activities. If, on the basis of the State's application and any other information available to him, the Administrator is unable to make a finding that the waters listed in the application require a complete prohibition of any discharge in the waters or portions thereof covered by the application, he shall state the reasons why he cannot make such a finding, and shall deny the application. If the Administrator makes a finding that the waters listed in the application require a complete prohibition of any discharge in all or any part of the waters or portions thereof covered by the State's application, he shall publish notice of such findings together with a notice of proposed rule making, and then shall proceed in accordance with 5 U.S.C. 553. If the Administrator's finding is that applicable water quality standards require a complete prohibition covering a more restricted or more expanded area than that applied for by the State, he shall state the reasons why his finding differs in scope from that requested in the State's application.

(l) For the following waters the discharge from a vessel of any sewage (whether treated or not) is completely prohibited:

Boundary Waters Canoe Area, formerly designated as the Superior, Little Indian Sioux, and Caribou Roadless Areas, in the Superior National Forest, Minnesota, as described in 16 U.S.C. 577-577d1.

[41 FR 4453, Jan. 29, 1976, as amended at 42 FR 43837, Aug. 31, 1977]

§ 140.5 Analytical procedures.

In determining the composition and uality of effluent discharge from arine sanitation devices, the proce-ures contained in 40 CFR Part 136, "Guidelines Establishing Test Proce-ures for the Analysis of Pollutants," or subsequent revisions or amendments thereto, shall be employed.

PART 141—NATIONAL PRIMARY DRINKING WATER REGULATIONS

Subpart A—General

Sec.
141.1 Applicability.
141.2 Definitions.
141.3 Coverage.
141.4 Variances and exemptions.
141.5 Siting requirements.
141.6 Effective dates.

Subpart B—Maximum Contaminant Levels

141.11 Maximum contaminant levels for inorganic chemicals.
141.12 Maximum contaminant levels for organic chemicals.
141.13 Maximum contaminant levels for turbidity.
141.14 Maximum microbiological contaminant levels.
141.15 Maximum contaminant levels for radium-226, radium-228, and gross alpha particle radioactivity in community water systems.
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Subpart C—Monitoring and Analytical Requirements

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141.100 Criteria and procedures for public water systems using point-of-entry devices.
141.101 Use of other non-centralized treatment devices.

AUTHORITY: 42 U.S.C. 300f, 300g-1, 300g-2, 300g-3, 300g-4, 300g-5, 300g-6, 300j-4, and 300j-9.

SOURCE: 40 FR 59570, Dec. 24, 1975, unless otherwise noted.

NOTE: For community water systems serving 75,000 or more persons, monitoring must begin 1 year following promulation and the effective date of the MCL is 2 years following promulgation. For community water systems serving 10,000 to 75,000 persons, monitoring must begin within 3 years from the date of promulgation and the effective date of the MCL is 4 years from the date of promulgation. Effective immediately, systems that plan to make significant modifications to their treatment processes for the purpose of complying with the TTHM MCL are required to seek and obtain State approval of their treatment modification plans. This note affects §§ 141.2, 141.6, 141.12, 141.24 and 141.30. For additional information see 44 FR 68641, Nov. 29, 1979.

Subpart A—General

§ 141.1 Applicability.

This part establishes primary drinking water regulations pursuant to section 1412 of the Public Health Service Act, as amended by the Safe Drinking Water Act (Pub. L. 93-523); and related regulations applicable to public water systems.

§ 141.2 Definitions.

As used in this part, the term:

"Act" means the Public Health Service Act, as amended by the Safe Drinking Water Act, Pub. L. 93-523.

"Best available technology" or "BAT" means the best technology, treatment techniques, or other means which the Administrator finds, after examination for efficacy under field conditions and not solely under laboratory conditions, are available (taking cost into consideration). For the purposes of setting MCLs for synthetic organic chemicals, any BAT must be at least as effective as granular activated carbon.

"Coagulation" means a process using coagulant chemicals and mixing by which colloidal and suspended materials are destabilized and agglomerated into flocs.

"Community water system" means a public water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

"Confluent growth" means a continuous bacterial growth covering the entire filtration area of a membrane filter, or a portion thereof, in which bacterial colonies are not discrete.

"Contaminant" means any physical, chemical, biological, or radiological substance or matter in water.

"Conventional filtration treatment" means a series of processes including coagulation, flocculation, sedimentation, and filtration resulting in substantial particulate removal.

"CT" or "CTcalc" is the product of "residual disinfectant concentration" (C) in mg/1 determined before or at the first customer, and the corresponding "disinfectant contact time" (T) in minutes, i.e., "C" x "T". If a public water system applies disinfectants at more than one point prior to the first customer, it must determine the CT of each disinfectant sequence before or at the first customer to determine the total percent inactivation or "total inactivation ratio." In determining the total inactivation ratio, the public water system must determine the residual disinfectant concentration of each disinfection sequence and corresponding contact time before any subsequent disinfection application point(s). "$CT_{99.9}$" is the CT value required for 99.9 percent (3-log) inactivation of *Giardia lamblia* cysts. $CT_{99.9}$ for a variety of disinfectants and conditions appear in Tables 1.1-1.6, 2.1, and 3.1 of § 141.74(b)(3).

$$\frac{CTcalc}{CT_{99.9}}$$

is the inactivation ratio. The sum of the inactivation ratios, or total inactivation ratio shown as

$$\Sigma \frac{(CTcalc)}{(CT_{99.9})}$$

is calculated by adding together the inactivation ratio for each disinfection sequence. A total inactivation ratio equal to or greater than 1.0 is assumed to provide a 3-log inactivation of *Giardia lamblia* cysts.

"Diatomaceous earth filtration" means a process resulting in substantial particulate removal in which (1) a precoat cake of diatomaceous earth filter media is deposited on a support membrance (septum), and (2) while the water is filtered by passing through the cake on the septum, additional filter media known as body feed is continuously added to the feed water to maintain the permeability of the filter cake.

"Direct filtration" means a series of processes including coagulation and filtration but excluding sedimentation resulting in substantial particulate removal.

"Disinfectant" means any oxidant, including but not limited to chlorine, chlorine dioxide, chloramines, and ozone added to water in any part of the treatment or distribution process, that is intended to kill or inactivate pathogenic microorganisms.

"Disinfectant contact time" ("T" in CT calculations) means the time in minutes that it takes for water to move from the point of disinfectant application or the previous point of disinfectant residual measurement to a point before or at the point where residual disinfectant concentration ("C") is measured. Where only one "C" is measured, "T" is the time in minutes that it takes for water to move from the point of disinfectant application to a point before or at where residual disinfectant concentration ("C") is measured. Where more than one "C" is measured, "T" is (a) for the first measurement of "C", the time in minutes that it takes for water to move from the first or only point of disinfectant application to a point before or at the point where the first "C" is measured and (b) for subsequent measurements of "C", the time in minutes that it takes for water to move from the previous "C" measurement point to the "C" measurement point for which the particular "T" is being calculated. Disinfectant contact time in pipelines must be calculated based on "plug flow" by dividing the internal volume of the pipe by the maximum hourly flow rate through that pipe. Disinfectant contact time within mixing basins and storage reservoirs must be determined by tracer studies or an equivalent demonstration.

"Disinfection" means a process which inactivates pathogenic organisms in water by chemical oxidants or equivalent agents.

"Domestic or other non-distribution system plumbing problem" means a coliform contamination problem in a public water system with more than one service connection that is limited to the specific service connection from which the coliform-positive sample was taken.

"Dose equivalent" means the product of the absorbed dose from ionizing radiation and such factors as account for differences in biological effectiveness due to the type of radiation and its distribution in the body as specified by the International Commission on Radiological Units and Measurements (ICRU).

"Filtration" means a process for removing particulate matter from water by passage through porous media.

"Flocculation" means a process to enhance agglomeration or collection of smaller floc particles into larger, more easily settleable particles through gentle stirring by hydraulic or mechanical means.

"Ground water under the direct influence of surface water" means any water beneath the surface of the ground with (1) significant occurrence of insects or other macroorganisms, algae, or large-diameter pathogens such as *Giardia lamblia*, or (2) significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions. Direct influence must be determined for individual sources in accordance with criteria established by the State. The State determination of direct influence may be based on site-specific measurements of water quality and/or documentation of well construction characteristics and geology with field evaluation.

"Gross alpha particle activity" means the total radioactivity due to alpha particle emission as inferred from measurements on a dry sample.

"Gross beta particle activity" means the total radioactivity due to beta particle emission as inferred from measurements on a dry sample.

"Halogen" means one of the chemical elements chlorine, bromine or iodine.

"*Legionella*" means a genus of bacteria, some species of which have caused a type of pneumonia called Legionnaires Disease.

"Man-made beta particle and photon emitters" means all radionuclides emitting beta particles and/or photons listed in Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure, NBS Handbook 69, except the daughter products of thorium-232, uranium-235 and uranium-238.

"Maximum contaminant level" means the maximum permissible level of a contaminant in water which is delivered to the free flowing outlet of the ultimate user of a public water system, except in the case of turbidity where the maximum permissible level is measured at the point of entry to the distribution system. Contaminants added to the water under circumstances controlled by the user, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from this definition.

"Maximum contaminant level goal" or "MCLG" means the maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety. Maximum contaminant level goals are nonenforceable health goals.

"Maximum Total Trihalomethane Potential (MTP)" means the maximum concentration of total trihalomethanes produced in a given water containing a disinfectant residual after 7 days at a temperature of 25° C or above.

"Near the first service connection" means at one of the 20 percent of all service connections in the entire system that are nearest the water supply treatment facility, as measured by water transport time within the distribution system.

"Non-community water system" means a public water system that is not a community water system.

"Non-transient non-community water system" or "NTNCWS" means a public water system that is not a community water system and that regulary serves at least 25 of the same persons over 6 months per year.

"Performance evaluation sample" means a reference sample provided to a laboratory for the purpose of demonstrating that the laboratory can successfully analyze the sample within limits of performance specified by the Agency. The true value of the concenration of the reference material is unnown to the laboratory at the time of he analysis.

"Person" means an individual; corpoation; company; association; partnerhip; municipality; or State, Federal, r tribal agency.

"Picocurie (pCi)" means the quantiy of radioactive material producing 22 nuclear transformations per inute.

"Point of disinfectant application" is he point where the disinfectant is apied and water downstream of that oint is not subject to recontaminaon by surface water runoff.

"Point-of-entry treatment device" is treatment device applied to the inking water entering a house or uilding for the purpose of reducing ntaminants in the drinking water stributed throughout the house or uilding.

'Point-of-use treatment device" is a eatment device applied to a single used for the purpose of reducing ntaminants in drinking water at at one tap.

"Public water system" means a system for the provision to the public of piped water for human consumption, if such system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least 60 days out of the year. Such term includes (1) any collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system, and (2) any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system. A public water system is either a "community water system" or a "noncommunity water system."

"Rem" means the unit of dose equivalent from ionizing radiation to the total body or any internal organ or organ system. A "millirem (mrem)" is 1/1000 of a rem.

"Residual disinfectant concentration" ("C" in CT calculations) means the concentration of disinfectant measured in mg/l in a representative sample of water.

"Sanitary survey" means an onsite review of the water source, facilities, equipment, operation and maintenance of a public water system for the purpose of evaluating the adequacy of such source, facilities, equipment, operation and maintenance for producing and distributing safe drinking water.

"Sedimentation" means a process for removal of solids before filtration by gravity or separation.

"Slow sand filtration" means a process involving passage of raw water through a bed of sand at low velocity (generally less than 0.4 m/h) resulting in substantial particulate removal by physical and biological mechanisms.

"Standard sample" means the aliquot of finished drinking water that is examined for the presence of coliform bacteria.

"State" means the agency of the State or Tribal government which has jurisdiction over public water systems. During any period when a State or Tribal government does not have primary enforcement responsibility pursuant to Section 1413 of the Act, the term "State" means the Regional Administrator, U.S. Environmental Protection Agency.

"Supplier of water" means any person who owns or operates a public water system.

"Surface water" means all water which is open to the atmosphere and subject to surface runoff.

"System with a single service connection" means a system which supplies drinking water to consumers via a single service line.

"Too numerous to count" means that the total number of bacterial colonies exceeds 200 on a 47-mm diameter membrane filter used for coliform detection.

"Total trihalomethanes" (TTHM) means the sum of the concentration in milligrams per liter of the trihalomethane compounds (trichloromethane [chloroform], dibromochloromethane, bromodichloromethane and tribromomethane [bromoform]), rounded to two significant figures.

"Trihalomethane" (THM) means one of the family of organic compounds, named as derivatives of methane, wherein three of the four hydrogen atoms in methane are each substituted by a halogen atom in the molecular structure.

"Virus" means a virus of fecal origin which is infectious to humans by waterborne transmission.

"Waterborne disease outbreak" means the significant occurrence of acute infectious illness, epidemiologically associated with the ingestion of water from a public water system which is deficient in treatment, as determined by the appropriate local or State agency.

[40 FR 59570, Dec. 24, 1975, as amended at 41 FR 28403, July 9, 1976; 44 FR 68641, Nov. 29, 1979; 51 FR 11410, Apr. 2, 1986; 52 FR 20674, June 2, 1987; 52 FR 25712, July 8, 1987; 53 FR 37410, Sept. 26, 1988; 54 FR 27526, 27562, June 29, 1989]

EFFECTIVE DATE NOTE: At 54 FR 27526, June 29, 1989, § 141.2 was amended by adding definitions for "coagulation," "conventional filtration treatment," "CT" or "CTcalc," "diatomaceous earth filtration," "direct filtration," disinfectant contact time," "disinfection" "filtration," "flocculation," "ground water under the direct influence of surface water," "*Legionella*," "point of disinfectant appplication," "residual disinfectant concentration," "sedimentation," "slow sand filtration," "surface water," "virus," and "waterborne disease outbreak," effective December 31, 1990.

EFFECTIVE DATE NOTE: At 54 FR 27562, June 29, 1989, § 141.2 was amended by adding definitions for "confluent growth," "domestic or other non-distribution system plumbing problem," "near the first service connection," "system with a single service connection" and "too numerous to count," effective December 31, 1990.

§ 141.3 Coverage.

This part shall apply to each public water system, unless the public water system meets all of the following conditions:

(a) Consists only of distribution and storage facilities (and does not have any collection and treatment facilities);

(b) Obtains all of its water from, but is not owned or operated by, a public water system to which such regulations apply:

(c) Does not sell water to any person; and

(d) Is not a carrier which conveys passengers in interstate commerce.

§ 141.4 Variances and exemptions.

Variances or exemptions from certain provisions of these regulations may be granted pursuant to sections 1415 and 1416 of the Act by the entity with primary enforcement responsibility, except that variances or exemptions from the MCL for total coliforms and variances from any of the treatment technique requirements of Subpart H of this part may not be granted.

[54 FR 27562, June 29, 1989]

EFFECTIVE DATE NOTE: At 54 FR 27562, June 29, 1989, § 141.4 was revised, effective December 31, 1990. For the convenience of the user, the superseded text follows.

§ 141.4 Variances and exemptions.

Variances or exemptions from certain provisions of these regulations may be granted pursuant to sections 1415 and 1416 of the Act by the entity with primary enforcement responsibility. Provisions under Part 142 *National Interim Primary Drinking Water Regulations Implementation*—Subpart E (Variances) and Subpart F (Exemptions)—apply where EPA has primary enforcement responsibility.

§ 141.5 Siting requirements.

Before a person may enter into a financial commitment for or initiate construction of a new public water system or increase the capacity of an existing public water system, he shall notify the State and, to the extent practicable, avoid locating part or all of the new or expanded facility at a site which:

(a) Is subject to a significant risk from earthquakes, floods, fires or other disasters which could cause a breakdown of the public water system or a portion thereof; or

(b) Except for intake structures, is within the floodplain of a 100-year flood or is lower than any recorded high tide where appropriate records exist. The U.S. Environmental Protection Agency will not seek to override land use decisions affecting public water systems siting which are made at the State or local government levels.

§ 141.6 Effective dates.

(a) Except as provided in paragraph (b) of this section, the regulations set forth in this part shall take effect on June 24, 1977.

(b) The regulations for total trihalomethanes set forth in § 141.12(c) shall ake effect 2 years after the date of promulgation of these regulations for community water systems serving 75,000 or more individuals, and 4 years after the date of promulgation for communities serving 10,000 to 74,999 ndividuals.

(c) The regulations set forth in § 141.11 (a), (d) and (e); 141.14(a)(1); 41.14(b)(1)(i); 141.14(b)(2)(i); 41.14(d); 141.21 (a), (c) and (i); 141.22 a) and (e); 141.23 (a)(3) and (a)(4); 41.23(f); 141.24(a)(3); 141.24 (e) and); 141.25(e); 141.27(a); 141.28 (a) and); 141.31 (a), (d) and (e); 141.32(b)(3); nd 141.32(d) shall take effect immediately upon promulgation.

(d) The regulations set forth in 141.41 shall take effect 18 months om the date of promulgation. Suppli s must complete the first round of mpling and reporting within 12 onths following the effective date.

(e) The regulations set forth in 41.42 shall take effect 18 months om the date of promulgation. All requirements in § 141.42 must be completed within 12 months following the effective date.

(f) The regulations set forth in § 141.11(c) and § 141.23(g) are effective May 2, 1986. Section 141.23(g)(4) is effective October 2, 1987.

[44 FR 68641, Nov. 29, 1979, as amended at 45 FR 57342, Aug. 27, 1980; 47 FR 10998, Mar. 12, 1982; 51 FR 11410, Apr. 2, 1986]

Subpart B—Maximum Contaminant Levels

§ 141.11 Maximum contaminant levels for inorganic chemicals.

(a) The MCL for nitrate is applicable to both community water systems and non-community water systems except as provided by in paragraph (d) of this section. The levels for the other inorganic chemicals apply only to community water systems. Compliance with MCLs for inorganic chemicals is calculated pursuant to § 141.23.

(b) The following are the maximum contaminant levels for inorganic chemicals other than fluoride:

Contaminant	Level, milligrams per liter
Arsenic	0.05
Barium	1
Cadmium	0.010
Chromium	0.05
Lead	0.05
Mercury	0.002
Nitrate (as N)	10
Selenium	0.01
Silver	0.05

(c) The maximum contaminant level for fluoride is 4.0 mg/l. See 40 CFR 143.3, which establishes a secondary maximum contaminant level at 2.0 mg/l.

(d) At the discretion of the State, nitrate levels not to exceed 20 mg/l may be allowed in a non-community water system if the supplier of water demonstrates to the satisfaction of the State that:

(1) Such water will not be available to children under 6 months of age; and

(2) There will be continuous posting of the fact that nitrate levels exceed 10 mg/l and the potential health effects of exposure; and

(3) Local and State public health authorities will be notified annually of nitrate levels that exceed 10 mg/l; and

(4) No adverse health effects shall result.

[40 FR 59570, Dec. 24, 1975, as amended at 45 FR 57342, Aug. 27, 1980; 47 FR 10998, Mar. 12, 1982; 51 FR 11410, Apr. 2, 1986]

§ 141.12 Maximum contaminant levels for organic chemicals.

The following are the maximum contaminant levels for organic chemicals. The maximum contaminant levels for organic chemicals in paragraphs (a) and (b) of this section apply to all community water systems. Compliance with the maximum contaminant levels in paragraphs (a) and (b) of this section, is calculated pursuant to § 141.24. The maximum comtaminant level for total trihalomethanes in paragraph (c) of this section applies only to community water systems which serve a population of 10,000 or more individuals and which add a disinfectant (oxidant) to the water in any part of the drinking water treatment process. Compliance with the maximum contaminant level for total trihalomethanes is calculated pursuant to § 141.30.

	Level, milligrams per liter
(a) Chlorinated hydrocarbons:	
Endrin (1,2,3,4,10, 10-hexachloro-6, 7-epoxy-1,4, 4a,5,6,7,8,81-octahydro-1,4-endo, endo-5,8-dimethano naphthalene)	0.0002
Lindane (1,2,3,4,5,6-hexachlorocyclohexane, gamma isomer)	0.004
Methoxychlor (1,1,1-Trichloro-2, 2-bis [p-methoxyphenyl] ethane)	0.1
Toxaphene ($C_{10}H_{10}Cl_8$-Technical chlorinated camphene, 67-69 percent chlorine)	0.005
(b) Chlorophenoxys:	
2,4-D, (2,4-Dichlorophenoxyacetic acid)	0.1
2,4,5-TP Silvex (2,4,5-Trichlorophenoxypropionic acid)	0.01
(c) Total trihalomethanes (the sum of the concentrations of bromodichloromethane, dibromochloromethane, tribromomethane (bromoform) and trichloromethane (chloroform))	0.10 mg/l.

[40 FR 59570, Dec. 24, 1975, as amended at 44 FR 68641, Nov. 29, 1979]

§ 141.13 Maximum contaminant levels for turbidity.

The maximum contaminant levels for turbidity are applicable to both community water systems and non-community water systems using surface water sources in whole or in part. The maximum contaminant levels for turbidity in drinking water, measured at a representative entry point(s) to the distribution system, are:

(a) One turbidity unit (TU), as determined by a monthly average pursuant to § 141.22, except that five or fewer turbidity units may be allowed if the supplier of water can demonstrate to the State that the higher turbidity does not do any of the following:

(1) Interfere with disinfection;

(2) Prevent maintenance of an effective disinfectant agent throughout the distribution system; or

(3) Interfere with microbiological determinations.

(b) Five turbidity units based on an average for two consecutive days pursuant to § 141.22.

[40 FR 59570, Dec. 24, 1975]

EFFECTIVE DATE NOTE: At 54 FR 27527, June 29, 1988, § 141.13 was amended, adding introductory text, effective December 31, 1990. This section already contains an introductory text. EPA will publish a document at a later date clarifying the status of the current introductory text. For the convenience of the user, the added material follows.

§ 141.13 Maximum contaminant levels for turbidity.

The requirements in this section apply to unfiltered systems until December 30, 1991, unless the State has determined prior to that date, in writing pursuant to § 1412(b)(7)(C)(iii), that filtration is required. The requirements in this section apply to filtered systems until June 29, 1993. The requirements in this section apply to unfiltered systems that the State has determined, in writing pursuant to § 1412(b)(7)(C)(iii), must install filtration, until June 29, 1993, or until filtration is installed, whichever is later.

* * * * *

§ 141.14 Maximum microbiological contaminant levels.

The maximum contaminant levels for coliform bacteria, applicable to community water systems and non-community water systems, are as follows:

(a) When the membrane filter technique pursuant to § 141.21(a) is used the number of coliform bacteria shall not exceed any of the following:

(1) One per 100 milliliters as the arithmetic mean of all samples examined per compliance period pursuant to § 141.21(b) or (c), except that, at the primacy Agency's discretion systems required to take 10 or fewer samples per month may be authorized to exclude one positive routine sample per month from the monthly calculation if:

(i) As approved on a case-by-case basis the State determines and indicates in writing to the public water system that no unreasonable risk to health existed under the conditions of this modification. This determination should be based upon a number of factors not limited to the following:

(A) The system provided and had maintained an active disinfectant residual in the distribution system, (B) the potential for contamination as indicated by a sanitary survey, and (C) the history of the water quality at the public water system (e.g. MCL or monitoring violations); (ii) the supplier initiates a check sample on each of two consecutive days from the same sampling point within 24 hours after notification that the routine sample is positive, and each of these check samples is negative; and (iii) the original positive routine sample is reported and recorded by the supplier pursuant to §§ 141.31(a) and 141.33(a). The supplier shall report to the State its compliance with the conditions specified in this paragraph and a summary of the corrective action taken to resolve the prior positive sample result. If a positive routine sample is not used for the monthly calculation, another routine sample must be analyzed for compliance purposes. This provision may be used only once during two consecutive compliance periods.

(2) Four per 100 milliliters in more than one sample when less than 20 are examined per month; or

(3) Four per 100 milliliters in more than five percent of the samples when 20 or more are examined per month.

(b) (1) When the fermentation tube method and 10 milliliter standard portions pursuant to § 141.21(a) are used, coliform bacteria shall not be present in any of the following:

(i) More than 10 percent of the portions (tubes) in any one month pursuant to § 141.21 (b) or (c) except that, at the State's discretion, systems required to take 10 or fewer samples per month may be authorized to exclude one positive routine sample resulting in one or more positive tubes per month from the monthly calculation if:

(A) As approved on a case-by-case basis the State determines and indicates in writing to the public water system that no unreasonable risk to health existed under the conditions of this modification. This determination should be based upon a number of factors not limited to the following: (*1*) The system provided and had maintained an active disinfectant residual in the distribution system, (*2*) the potential for contamination as indicated by a sanitary survey, and (*3*) the history of the water quality at the public water system (e.g. MCL or monitoring violations);

(B) The supplier initiates a check sample on each of two consecutive days from the sampling point within 24 hours after notification that the routine sample is positive, and each of these check samples is negative; and

(C) The original positive routine sample is reported and recorded by the supplier pursuant to § 141.31(a) and § 141.33(a). The supplier shall report to the State its compliance with the conditions specified in this paragraph and report the action taken to resolve the prior positive sample result. If a positive routine sample is not used for the monthly calculation, another routine sample must be analyzed for compliance purposes. This provision may be used only once during two consecutive compliance periods.

(ii) Three or more portions in more than one sample when less than 20 samples are examined per month; or

(iii) Three or more portions in more than five percent of the samples when 20 or more samples are examined per month.

(2) When the fermentation tube method and 100 milliliter standard portions pursuant to § 141.21(a) are used, coliform bacteria shall not be present in any of the following:

(i) More than 60 percent of the portions (tubes) in any month pursuant to § 141.21 (b) or (c), except that, State discretion, systems required to take 10 or fewer samples per month may be authorized to exclude one positive routine sample resulting in one or more positive tubes per month from the monthly calculation if:

(A) As approved on a case-by-case basis the State determines and indicates in writing to the public water system that no unreasonable risk to health existed under the conditions of this modification. This determination should be based upon a number of factors not limited to the following: (*1*) The system provided and had maintained an active disinfectant residual in the distribution system, (*2*) the potential for contamination as indicated by a sanitary survey, and (*3*) the history of the water quality at the public water system (e.g. MCL or monitoring violations);

(B) The supplier initiates two consecutive daily check samples from the same sampling point within 24 hours after notification that the routine sample is positive, and each of these check samples is negative; and

(C) The original positive routine sample is reported and recorded by the supplier pursuant to § 141.31(a) and § 141.33(a). The supplier shall report to the State its compliance with the conditions specified in this paragraph and a summary of the corrective action taken to resolve the prior positive sample result. If a positive routine sample is not used for the monthly calculation, another routine sample must be analyzed for compliance purposes. This provision may be used only once during two consecutive compliance periods.

(ii) Five portions in more than one sample when less than five samples are examined per month; or

(iii) Five portions in more than 20 percent of the samples when five or more samples are examined per month.

(3) When the Minimal Medium ONPG-MUG test described in § 141.21(a) of this part is used, coliform bacteria shall not be present at levels exceeding those specified in paragraph (b)(1) (i)–(iii) of this section.

(c) For community or non-community systems that are required to sample at a rate of less than 4 per month compliance with paragraph (a), (b)(1), or (b)(2) of this section shall be based upon sampling during a 3 month period, except that, at the discretion of the State, compliance may be based upon sampling during a one-month period.

(d) If an average MCL violation is caused by a single sample MCL violation, then the case shall be treated as one violation with respect to the public notification requirements of § 141.32.

[40 FR 59570, Dec. 24, 1975, as amended at 45 FR 57343, Aug. 27, 1980; 54 FR 3000, July 17, 1989]

EFFECTIVE DATE NOTE: At 54 FR 2756, June 29, 1989, § 141.14 was removed, effective December 31, 1990.

§ 141.15 Maximum contaminant levels for radium-226, radium-228, and gross alpha particle radioactivity in community water systems.

The following are the maximum contaminant levels for radium-226, radium-228, and gross alpha particle radioactivity:

(a) Combined radium-226 and radium-228—5 pCi/1.

(b) Gross alpha particle activity (including radium-226 but excluding radon and uranium)—15 pCi/1.

[41 FR 28404, July 9, 1976]

§ 141.16 Maximum contaminant levels for beta particle and photon radioactivity from man-made radionuclides in community water systems.

(a) The average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water shall not produce an annual dose equivalent to the total body or any internal organ greater than 4 millirem/year.

(b) Except for the radionuclides listed in Table A, the concentration of man-made radionuclides causing 4 mrem total body or organ dose equivalents shall be calculated on the basis of a 2 liter per day drinking water intake using the 168 hour data listed in *"Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure,"* NBS Handbook 69 as amended August 1963, U.S. Department of Commerce. If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed 4 millirem/year.

TABLE A—AVERAGE ANNUAL CONCENTRATIONS ASSUMED TO PRODUCE A TOTAL BODY OR ORGAN DOSE OF 4 MREM/YR

Radionuclide	Critical organ	pCi per liter
Tritium	Total body	20,000
Strontium-90	Bone marrow	8

[41 FR 28404, July 9, 1976]

Subpart C—Monitoring and Analytical Requirements

141.21 Coliform sampling.

(a) *Routine monitoring.* (1) Public ater systems must collect total coliform samples at sites which are repre- entative of water throughout the dis- ribution system according to a writ- en sample siting plan. These plans are ubject to State review and revision.

(2) The monitoring frequency for otal coliforms for community water ystems is based on the population erved by the system, as follows:

TOTAL COLIFORM MONITORING FREQUENCY FOR COMMUNITY WATER SYSTEMS

Population served	Minimum number of samples per month
to 1,000[1]	1
01 to 2,500	2
01 to 3,300	3
01 to 4,100	4
01 to 4,900	5
01 to 5,800	6
01 to 6,700	7
01 to 7,600	8
01 to 8,500	9
01 to 12,900	10
901 to 17,200	15
201 to 21,500	20
501 to 25,000	25

TOTAL COLIFORM MONITORING FREQUENCY FOR COMMUNITY WATER SYSTEMS—Continued

Population served	Minimum number of samples per month
25,001 to 33,000	30
33,001 to 41,000	40
41,001 to 50,000	50
50,001 to 59,000	60
59,001 to 70,000	70
70,001 to 83,000	80
83,001 to 96,000	90
96,001 to 130,000	100
130,001 to 220,000	120
220,001 to 320,000	150
320,001 to 450,000	180
450,001 to 600,000	210
600,001 to 780,000	240
780,001 to 970,000	270
970,001 to 1,230,000	300
1,230,001 to 1,520,000	330
1,520,001 to 1,850,000	360
1,850,001 to 2,270,000	390
2,270,001 to 3,020,000	420
3,020,001 to 3,960,000	450
3,960,001 or more	480

[1] Includes public water systems which have at least 15 service connections, but serve fewer than 25 persons.

If a community water system serving 25 to 1,000 persons has no history of total coliform contamination in its current configuration and a sanitary survey conducted in the past five years shows that the system is supplied solely by a protected groundwater source and is free of sanitary defects, the State may reduce the monitoring frequency specified above, except that in no case may the State reduce the monitoring frequency to less than one sample per quarter. The State must approve the reduced monitoring frequency in writing.

(3) The monitoring frequency for total coliforms for non-community water systems is as follows:

(i) A non-community water system using only ground water (except ground water under the direct influence of surface water, as defined in § 141.2) and serving 1,000 persons or fewer must monitor each calendar quarter that the system provides water to the public, except that the State may reduce this monitoring frequency, in writing, if a sanitary survey shows that the system is free of sanitary defects. Beginning June 29, 1994, the State cannot reduce the monitoring frequency for a non-community water system using only ground water (except ground water under the direct influence of surface water, as defined in § 141.2) and serving 1,000 persons or fewer to less than once/year.

(ii) A non-community water system using only ground water (except ground water under the direct influence of surface water, as defined in § 141.2) and serving more than 1,000 persons during any month must monitor at the same frequency as a like-sized community water system, as specified in paragraph (a)(2) of this section, except the State may reduce this monitoring frequency, in writing, for any month the system serves 1,000 persons or fewer. The State cannot reduce the monitoring frequency to less than once/year. For systems using ground water under the direct influence of surface water, paragraph (a)(3)(iv) of this section applies.

(iii) A non-community water system using surface water, in total or in part, must monitor at the same frequency as a like-sized community water system, as specified in paragraph (a)(2) of this section, regardless of the number of persons it serves.

(iv) A non-community water system using ground water under the direct influence of surface water, as defined in § 141.2, must monitor at the same frequency as a like-sized community water system, as specified in paragraph (a)(2) of this section. The system must begin monitoring at this frequency beginning six months after the State determines that the ground water is under the direct influence of surface water.

(4) The public water system must collect samples at regular time intervals throughout the month, except that a system which uses only ground water (except ground water under the direct influence of surface water, as defined in § 141.2), and serves 4,900 persons or fewer, may collect all required samples on a single day if they are taken from different sites.

(5) A public water system that uses surface water or ground water under the direct influence of surface water, as defined in § 141.2, and does not practice filtration in compliance with Subpart H must collect at least one sample near the first service connection each day the turbidity level of the source water, measured as specified in § 141.74(b)(2), exceeds 1 NTU. This sample must be analyzed for the presence of total coliforms. When one or more turbidity measurements in any day exceed 1 NTU, the system must collect this coliform sample within 24 hours of the first exceedance, unless the State determines that the system, for logistical reasons outside the system's control, cannot have the sample analyzed within 30 hours of collection. Sample results from this coliform monitoring must be included in determining compliance with the MCL for total coliforms in § 141.63.

(6) Special purpose samples, such a those taken to determine whether disinfection practices are sufficient following pipe placement, replacement or repair, shall not be used to determine compliance with the MCL fo total coliforms in § 141.63. Repea samples taken pursuant to paragrap (b) of this section are not considere special purpose samples, and must b used to determine compliance with th MCL for total coliforms in § 141.63.

(b) *Repeat monitoring.* (1) If a routine sample is total coliform-positive the public water system must collect set of repeat samples within 24 hour of being notified of the positive result A system which collects more tha one routine sample/month must collect no fewer than three repeat samples for each total coliform-positiv sample found. A system which collect one routine sample/month or fewe must collect no fewer than four repea samples for each total coliform-pos tive sample found. The State ma extend the 24-hour limit on a case-b case basis if the system has a logistic problem in collecting the repeat samples within 24 hours that is beyond i control. In the case of an extensio the State must specify how much tim the system has to collect the repe samples.

(2) The system must collect at lea one repeat sample from the samplin tap where the original total colifor positive sample was taken, and at lea one repeat sample at a tap within fi service connections upstream and least one repeat sample at a tap with

five service connections downstream of the original sampling site. If a total coliform-positive sample is at the end of the distribution system, or one away from the end of the distribution system, the State may waive the requirement to collect at least one repeat sample upstream or downstream of the original sampling site.

(3) The system must collect all repeat samples on the same day, except that the State may allow a system with a single service connection to collect the required set of repeat samples over a four-day period or to collect a larger volume repeat sample(s) in one or more sample containers of any size, as long as the total volume collected is at least 400 ml (300 ml for systems which collect more than one routine sample/month).

(4) If one or more repeat samples in the set is total coliform-positive, the public water system must collect an additional set of repeat samples in the manner specified in paragraphs (b)(1)-(3) of this section. The additional samples must be collected within 24 hours of being notified of the positive result, unless the State extends the limit as provided in paragraph (b)(1) of this section. The system must repeat this process until either total coliforms are not detected in one complete set of repeat samples or the system determines that the MCL for total coliforms in § 141.63 has been exceeded and notifies the State.

(5) If a system collecting fewer than five routine samples/month has one or more total coliform-positive samples and the State does not invalidate the sample(s) under paragraph (c) of this section, it must collect at least five routine samples during the next month the system provides water to the public, except that the State may waive this requirement if the conditions of paragraph (b)(5) (i) or (ii) of this section are met. The State cannot waive the requirement for a system to collect repeat samples in paragraphs (b)(1)-(4) of this section.

(i) The State may waive the requirement to collect five routine samples the next month the system provides water to the public if the State, or an agent approved by the State, performs a site visit before the end of the next month the system provides water to the public. Although a sanitary survey need not be performed, the site visit must be sufficiently detailed to allow the State to determine whether additional monitoring and/or any corrective action is needed. The State cannot approve an employee of the system to perform this site visit, even if the employee is an agent approved by the State to perform sanitary surveys.

(ii) The State may waive the requirement to collect five routine samples the next month the system provides water to the public if the State has determined why the sample was total coliform-positive and establishes that the system has corrected the problem or will correct the problem before the end of the next month the system serves water to the public. In this case, the State must document this decision to waive the following month's additional monitoring requirement in writing, have it approved and signed by the supervisor of the State official who recommends such a decision, and make this document available to the EPA and public. The written documentation must describe the specific cause of the total coliform-positive sample and what action the system has taken and/or will take to correct this problem. The State cannot waive the requirement to collect five routine samples the next month the system provides water to the public solely on the grounds that all repeat samples are total coliform-negative. Under this paragraph, a system must still take at least one routine sample before the end of the next month it serves water to the public and use it to determine compliance with the MCL for total coliforms in § 141.63, unless the State has determined that the system has corrected the contamination problem before the system took the set of repeat samples required in paragraphs (b)(1)-(4) of this section, and all repeat samples were total coliform-negative.

(6) After a system collects a routine sample and before it learns the results of the analysis of that sample, if it collects another routine sample(s) from within five adjacent service connections of the initial sample, and the initial sample, after analysis, is found to

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contain total coliforms, then the system may count the subsequent sample(s) as a repeat sample instead of as a routine sample.

(7) Results of all routine and repeat samples not invalidated by the State must be included in determining compliance with the MCL for total coliforms in § 141.63.

(c) *Invalidation of total coliform samples.* A total coliform-positive sample invalidated under this paragraph (c) does not count towards meeting the minimum monitoring requirements of this section. (1) The State may invalidate a total coliform-positive sample only if the conditions of paragraph (c)(1)(i), (ii), or (iii) of this section are met.

(i) The laboratory establishes that improper sample analysis caused the total coliform-positive result.

(ii) The State, on the basis of the results of repeat samples collected as required by paragraphs (b) (1) through (4) of this section, determines that the total coliform-positive sample resulted from a domestic or other non-distribution system plumbing problem. The State cannot invalidate a sample on the basis of repeat sample results unless all repeat sample(s) collected at the same tap as the original total coliform-positive sample are also total coliform-positive, and all repeat samples collected within five service connections of the original tap are total coliform-negative (e.g., a State cannot invalidate a total coliform-positive sample on the basis of repeat samples if all the repeat samples are total coliform-negative, or if the public water system has only one service connection).

(iii) The State has substantial grounds to believe that a total coliform-positive result is due to a circumstance or condition which does not reflect water quality in the distribution system. In this case, the system must still collect all repeat samples required under paragraphs (b) (1)-(4) of this section, and use them to determine compliance with the MCL for total coliforms in § 141.63. To invalidate a total coliform-positive sample under this paragraph, the decision with the rationale for the decision must be documented in writing, and approved and signed by the supervisor of the State official who recommended the decision. The State must make this document available to EPA and the public. The written documentation must state the specific cause of the total coliform-positive sample, and what action the system has taken, or will take, to correct this problem. The State may not invalidate a total coliform-positive sample solely on the grounds that all repeat samples are total coliform-negative.

(2) A laboratory must invalidate a total coliform sample (unless total coliforms are detected) if the sample produces a turbid culture in the absence of gas production using an analytical method where gas formation is examined (e.g., the Multiple-Tube Fermentation Technique), produces a turbid culture in the absence of an acid reaction in the Presence-Absence (P-A) Coliform Test, or exhibits confluent growth or produces colonies too numerous to count with an analytical method using a membrane filter (e.g., Membrane Filter Technique). If a laboratory invalidates a sample because of such interference, the system must collect another sample from the same location as the original sample within 24 hours of being notified of the interference problem, and have it analyzed for the presence of total coliforms. The system must continue to resample within 24 hours and have the samples analyzed until it obtains a valid result. The State may waive the 24-hour time limit on a case-by-case basis.

(d) *Sanitary surveys.* (1)(i) Public water systems which do not collect five or more routine samples/month must undergo an initial sanitary survey by June 29, 1994, for community public water systems and June 29, 1999, for non-community water systems. Thereafter, systems must undergo another sanitary survey every five years, except that non-community water systems using only protected and disinfected ground water, as defined by the State, must undergo subsequent sanitary surveys at least every ten years after the initial sanitary survey. The State must review the results of each sanitary survey to determine whether the existing monitoring frequency is adequate and what additional measures, if any, the system needs to undertake to improve drinking water quality.

(ii) In conducting a sanitary survey of a system using ground water in a State having an EPA-approved wellhead protection program under section 1428 of the Safe Drinking Water Act, information on sources of contamination within the delineated wellhead protection area that was collected in the course of developing and implementing the program should be considered instead of collecting new information, if the information was collected since the last time the system was subject to a sanitary survey.

(2) Sanitary surveys must be performed by the State or an agent approved by the State. The system is responsible for ensuring the survey takes place.

(e) *Fecal coliforms/Escherichia coli (E. coli) testing.* (1) If any routine or repeat sample is total coliform-positive, the system must analyze that total coliform-positive culture medium to determine if fecal coliforms are present, except that the system may test for *E. coli* in lieu of fecal coliforms. If fecal coliforms or *E. coli* are present, the system must notify the State by the end of the day when the system is notified of the test result, unless the system is notified of the result after the State office is closed, in which case the system must notify the State before the end of the next business day.

(2) The State has the discretion to allow a public water system, on a case-by-case basis, to forgo fecal coliform or *E. coli* testing on a total coliform-positive sample if that system assumes that the total coliform-positive sample is fecal coliform-positive or *E. coli*-positive. Accordingly, the system must notify the State as specified in paragraph (e)(1) of this section and the provisions of § 141.63(b) apply.

(f) *Analytical methodology.* (1) The standard sample volume required for total coliform analysis, regardless of analytical method used, is 100 ml.

(2) Public water systems need only determine the presence or absence of total coliforms; a determination of total coliform density is not required.

(3) Public water systems must conduct total coliform analyses in accordance with one of the following analytical methods:

(i) Multiple-Tube Fermentation (MTF) Technique, as set forth in *Standard Methods for the Examination of Water and Wastewater*, 1985, American Public Health Association *et al.*, 16th edition, Method 908, 908A, and 908B—pp. 870-878, except that 10 fermentation tubes must be used; or *Microbiological Methods for Monitoring the Environment, Water and Wastes*, U.S. EPA, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268 (EPA-600/8-78-017, December 1978, available from ORD Publications, CERI, U.S. EPA, Cincinnati, Ohio 45268), Part III, Section B.4.1-4.6.4, pp. 114-118 (Most Probable Number Method), except that 10 fermentation tubes must be used; or

(ii) Membrance Filter (MF) Technique, as set forth in *Standard Methods for the Examination of Water and Wastewater*, 1985, American Public Health Association *et al.*, 16th edition, Method 909, 909A and 909B—pp. 886-896; or *Microbiological Methods for Monitoring the Environment, Water and Wastes*, U.S. EPA, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268 (EPA-600/8-78-017, December 1978, available from ORD Publications, CERI, U.S. EPA, Cincinnati, Ohio 45268), Part III, Section B.2.1-2.6, pp. 108-112; or

(iii) Presence-Absence (P-A) Coliform Test, as set forth in *Standard Methods for the Examination of Water and Wastewater*, 1985, American Public Health Association *et al.*, 16th edition, Method 908E—pp. 882-886; or

(iv) Minimal Medium ONPG-MUG (MMO-MUG) Test, as set forth in the article "National Field Evaluation of a Defined Substrate Method for the Simultaneous Detection of Total Coliforms and *Escherichia coli* from Drinking Water: Comparison with Presence-Absence Techniques" (Edberg *et al.*), Applied and Environmental Microbiology, Volume 55, pp. 1003-1008, April 1989. (Note: The MMO-MUG Test is sometimes referred to as the Autoanalysis Colilert System.)

(4) In lieu of the 10-tube MTF Technique specified in paragraph (f)(3)(i) of this section, a public water system may use the MTF Technique using either five tubes (20-ml sample portions) or a single culture bottle containing the culture medium for the MTF Technique, i.e., lauryl tryptose broth (formulated as described in *Standard Methods for the Examination of Water and Wastewater*, 1985, American Public Health Association *et al.*, 16th Edition, Method 908A—p. 872), as long as a 100-ml water sample is used in the analysis.

(5) Public water systems must conduct fecal coliform analysis in accordance with the following procedure. When the MTF Technique or Presence-Absence (P-A) Coliform Test is used to test for total coliforms, shake the lactose-positive presumptive tube or P-A bottle vigorously and transfer the growth with a sterile 3-mm loop or sterile applicator stick into brilliant green lactose bile broth and EC medium to determine the presence of total and fecal coliforms, respectively. For EPA-approved analytical methods which use a membrance filter, remove the membrane containing the total coliform colonies from the substrate with a sterile forceps and carefully curl and insert the membrane into a tube of EC medium. (The laboratory may first remove a small portion of selected colonies for verification.) Gently shake the inoculated EC tubes to insure adequate mixing and incubate in a waterbath at 44.5 ±0.2 °C for 24 ± 2 hours. Gas production of any amount in the inner fermentation tube of the EC medium indicates a positive fecal coliform test. The preparation of EC medium is described in *Standard Methods for the Examination of Water and Wastewater*, American Public Health Association, 16th Edition, Method 908C—p. 879, paragraph 1a. Public water systems need only determine the presence or absence of fecal coliforms; a determination of fecal coliform density is not required.

(6) These incorporations by reference were approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies of the analytical methods cited in *Standard Methods for the Examination of Water and Wastewater* may be obtained from the American Public Health Association *et al.*; 1015 Fifteenth Street, NW.; Washington, DC 20005. Copies of the methods set forth in *Microbiological Methods for Monitoring the Environment, Water and Wastes* may be obtained from ORD Publications, U.S. EPA, 26 W. Martin Luther King Drive, Cincinnati, Ohio 45268. Copies of the MMO-MUG Test as set forth in the article "National Field Evaluation of a Defined Substrate Method for the Simultaneous Enumeration of Total Coliforms and *Escherichia coli* from Drinking Water: Comparison with the Standard Multiple Tube Fermentation Method" (Edberg *et al.*) may be obtained from the American Water Works Association Research Foundation, 6666 West Quincy Avenue, Denver, CO 80235. Copies may be inspected at EPA's Drinking Water Docket; 401 M Street, SW.; Washington, DC 20460, or at the Office of the Federal Register; 1100 L Street, NW.; Room 8401; Washington, DC 20408.

(g) *Response to violation.* (1) A public water system which has exceeded the MCL for total coliforms in § 141.63 must report the violation to the State no later than the end of the next business day after it learns of the violation, and notify the public in accordance with § 141.32.

(2) A public water system which has failed to comply with a coliform monitoring requirement, including the sanitary survey requirement, must report the monitoring violation to the State within ten days after the system discovers the violation, and notify the public in accordance with § 141.32.

[54 FR 27562, June 29, 1989; 55 FR 25064, June 19, 1990]

EFFECTIVE DATE NOTE: At 54 FR 27562, June 29, 1989, § 141.21 was revised, effective December 31, 1990. At 55 FR 25064, June 19, 1990, paragraphs (a)(2), (a)(3)(i), (a)(3)(vi), (a)(4), (c)(1)(iii), (d)(1)(i), (e)(2), (f)(3)(iv), (f)(4), and (f)(5) were corrected, effective December 31, 1990. For the convenience of the user the superseded text appears as follows:

§ 141.21 Microbiological contaminant sampling and analytical requirements.

(a) Suppliers of water for community and non-community water systems shall analyze or use the services of an approved laboratory for coliform bacteria to determine compliance with § 141.14. Analyses shall be conducted in accordance with the analytical recommendations set forth in "Standard Methods for the Examination of Water and Wastewater," American Public Health Association, 14th Edition, Method 908A, Paragraphs 1, 2 and 3—pp. 916-918; Method 908D, Table 908: I—p. 923; Method 909A, pp. 928-935, or "Microbiological Methods for Monitoring the Environment, Water and Wastes," U.S. EPA, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268—EPA-600/8-78-017, December 1978. Available from ORD Publications, CERI, U.S. EPA, Cincinnati, Ohio 45268. Part III, Section B 1.0 through 2.6.2, pp. 108-112; 2.7 through 2.7.2(c), pp. 112-113; Part III, Section B 4.0 through 4.6.4(c), pp. 114-118, except that a standard sample size shall be employed. The standard sample used in the membrane filter procedure shall be 100 milliliters. The standard sample used in the 5 tube most probable number (MPN) procedure (fermentation tube method) shall be 5 times the standard portion. The standard portion is either 10 milliliters or 100 milliliters as described in § 141.14 (b) and (c). The samples shall be taken at points which are representative of the conditions within the distribution system. Total coliform analyses may also be conducted by the Minimal Media ONPG-MUG (MMO-MUG) test described in Edberg, et al. (1988) except that 10 ml of water sample must be added to each of the five tubes. Analyses must be conducted in accordance with the analytical recommendations set forth in "National Field Evaluation of a Defined Substrate Method for the Simultaneous Enumeration of Total Coliforms and *Escherichia coli* from Drinking Water: Comparison with the Standard Multiple Tube Fermentation Method," Stephen C. Edberg, Martin J. Allen, Darwell B. Smith, and the National Collaborative Study, Applied and Environmental Microbiology, 54:1595-1601, June 1988 (amended under Erratum, Applied and Environmental Microbiology, 54:3197, December 1988). This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies may be obtained from the American Water Works Association Research Foundation, 6666 West Quincy Avenue, Denver, CO 80235 (telephone 303-794-7711). Copies may be inspected at EPA's Drinking Water Docket, 401 M Street, SW., Washington, DC 20460, or at the Office of the Federal Register, 1100 L Street, NW., Room 8401, Washington, DC.

(b) The supplier of water for a community water system shall take coliform density samples at regular time intervals, and in number proportionate to the population served by the system. In no event shall the frequency be less than as set forth below:

Population served	Minimum number of samples per month
25 to 1,000	1
1,001 to 2,500	2
2,501 to 3,300	3
3,301 to 4,100	4
4,101 to 4,900	5
4,901 to 5,800	6
5,801 to 6,700	7
6,701 to 7,600	8
7,601 to 8,500	9
8,501 to 9,400	10
9,401 to 10,300	11
10,301 to 11,100	12
11,101 to 12,000	13
12,001 to 12,900	14
12,901 to 13,700	15
13,701 to 14,600	16
14,601 to 15,500	17
15,501 to 16,300	18
16,301 to 17,200	19
17,201 to 18,100	20
18,101 to 18,900	21
18,901 to 19,800	22
19,801 to 20,700	23
20,701 to 21,500	24
21,501 to 22,300	25
22,301 to 23,200	26
23,201 to 24,000	27
24,001 to 24,900	28
24,901 to 25,000	29
25,001 to 28,000	30
28,001 to 33,000	35
33,001 to 37,000	40
37,001 to 41,000	45
41,001 to 46,000	50
46,001 to 50,000	55
50,001 to 54,000	60
54,001 to 59,000	65
59,001 to 64,000	70
64,001 to 70,000	75
70,001 to 76,000	80
76,001 to 83,000	85
83,001 to 90,000	90
90,001 to 96,000	95
96,001 to 111,000	100
111,001 to 130,000	110
130,001 to 160,000	120
160,001 to 190,000	130
190,001 to 220,000	140
220,001 to 250,000	150
250,001 to 290,000	160
290,001 to 320,000	170
320,001 to 360,000	180
360,001 to 410,000	190
410,001 to 450,000	200
450,001 to 500,000	210
500,001 to 550,000	220
550,001 to 600,000	230
600,001 to 660,000	240
660,001 to 720,000	250
720,001 to 780,000	260

Population served	Minimum number of samples per month
760,001 to 840,000	270
840,001 to 910,000	280
910,001 to 970,000	290
970,001 to 1,050,000	300
1,050,001 to 1,140,000	310
1,140,001 to 1,230,000	320
1,230,001 to 1,320,000	330
1,320,001 to 1,420,000	340
1,420,001 to 1,520,000	350
1,520,001 to 1,630,000	360
1,630,001 to 1,730,000	370
1,730,001 to 1,850,000	380
1,850,001 to 1,970,000	390
1,970,001 to 2,060,000	400
2,060,001 to 2,270,000	410
2,270,001 to 2,510,000	420
2,510,001 to 2,750,000	430
2,750,001 to 3,020,000	440
3,020,001 to 3,320,000	450
3,320,001 to 3,620,000	460
3,620,001 to 3,960,000	470
3,960,001 to 4,310,000	480
4,310,001 to 4,690,000	490
4,690,001 or more	500

Based on a history of no coliform bacterial contamination and on a sanitary survey by the State showing the water system to be supplied solely by a protected ground water source and free of sanitary defects, a community water system serving 25 to 1,000 persons, with written permission from the State, may reduce this sampling frequency except that in no case shall it be reduced to less than one per quarter.

(c) The supplier of water for a non-community water system shall be responsible for sampling coliform bacteria in each calendar quarter that the system provides water to the public. Such sampling shall begin within two years after promulgation. The State can adjust the monitoring frequency on the basis of a sanitary survey, the existence of additional safeguards such as a protective and enforced well code, or accumulated analytical data. Such frequency shall be confirmed or modified on the basis of subsequent surveys or data. The frequency shall not be reduced until the non-community water system has performed at least one coliform analysis of its drinking water and shown to be in compliance with § 141.14.

(d) (1) When the coliform bacteria in a single sample exceed four per 100 milliliters (§ 141.14(a)), at least two consecutive daily check samples shall be collected and examined from the same sampling point. Additional check samples shall be collected daily, or at a frequency established by the State, until the results obtained from at least two consecutive check samples show less than one coliform bacterium per 100 milliliters.

(2) When coliform bacteria occur in three or more 10 ml portions of a single sample (§ 141.14(b)(1)), at least two consecutive daily check samples shall be collected and examined from the same sampling point. Additional check samples shall be collected daily, or at a frequency established by the State, until the results obtained from at least two consecutive check samples show no positive tubes.

(3) When coliform bacteria occur in all five of the 100 ml portions of a single sample (§ 141.14(b)(2)), at least two daily check samples shall be collected and examined from the same sampling point. Additional check samples shall be collected daily, or at a frequency established by the State, until the results obtained from at least two consecutive check samples show no positive tubes.

(4) The location at which the check samples were taken pursuant to paragraph (d) (1), (2), or (3) of this section shall not be eliminated from future sampling without approval of the State. The results from all coliform bacterial analyses performed pursuant to this subpart, except those obtained from check samples and special purpose samples, shall be used to determine compliance with the maximum contaminant level for coliform bacteria as established in § 141.14. Check samples shall not be included in calculating the total number of samples taken each month to determine compliance with § 141.21 (b) or (c).

(e) When the presence of coliform bacteria in water taken from a particular sampling point has been confirmed by any check samples examined as directed in paragraph (d) (1), (2), or (3) of this section, the supplier of water shall report to the State within 48 hours.

(f) When a maximum contaminant level set forth in paragraph (a), (b) or (c) of § 141.14 is exceeded, the supplier of water shall report to the State and notify the public as prescribed in § 141.31 and § 141.32.

(g) Special purpose samples, such as those taken to determine whether disinfection practices following pipe placement, replacement, or repair have been sufficient, shall not be used to determine compliance with § 141.14 or § 141.21 (b) or (c).

(h) A supplier of water of a community water system or a non-community water system may, with the approval of the State and based upon a sanitary survey, substitute the use of chlorine residual monitoring for not more than 75 percent of the samples required to be taken by paragraph (b) of this section, *Provided*, That the supplier of water takes chlorine residual samples at points which are representative of the conditions within the distribution system at the frequency of at least four for each substituted microbiological sample. There shall be at least daily determinations of chlorine residual. When the supplier of water exercises the option provided in this paragraph (h) of this section, he shall maintain no less than 0.2 mg/1 free chlorine throughout the public water distribution system. When a particular sampling point has been shown to have a free chlorine residual less than 0.2 mg/1, the water at that location shall be retested as soon as practicable and in any event within one hour. If the original analysis is confirmed, this fact shall be reported to the State within 48 hours. Also, if the analysis is confirmed, a sample for coliform bacterial analysis must be collected from that sampling point as soon as practicable and preferably within one hour, and the results of such analysis reported to the State within 48 hours after the results are known to the supplier of water. Analyses for residual chlorine shall be made in accordance with "Standard Methods for the Examination of Water and Wastewater," 13th Ed., pp. 129-132. Compliance with the maximum contaminant levels for coliform bacteria shall be determined on the monthly mean or quarterly mean basis specified in § 141.14, including those samples taken as a result of failure to maintain the required chlorine residual level. The State may withdraw its approval of the use of chlorine residual substitution at any time.

(i) The State has the authority to determine compliance or initiate enforcement action based upon analytical results or other information compiled by their sanctioned representatives and agencies.

[40 FR 59570, Dec. 24, 1975, as amended at 45 FR 57343, Aug. 27, 1980; 54 FR 30001, July 17, 1989]

§ 141.22 Turbidity sampling and analytical requirements.

The requirements in this section apply to unfiltered systems until December 30, 1991, unless the State has determined prior to that date, in writing pursuant to section 1412(b)(7)(iii), that filtration is required. The requirements in this section apply to filtered systems until June 29, 1993. The requirements in this section apply to unfiltered systems that the State has determined, in writing pursuant to section 1412(b)(7)(C)(iii), must install filtration, until June 29, 1993, or until filtration is installed, whichever is later.

(a) Samples shall be taken by suppliers of water for both community and non-community water systems at a representative entry point(s) to the water distribution system at least once per day, for the purposes of making turbidity measurements to determine compliance with § 141.13. If the State determines that a reduced sampling frequency in a non-community will not pose a risk to public health, it can reduce the required sampling frequency. The option of reducing the turbidity frequency shall be permitted only in those public water systems that practice disinfection and which maintain an active residual disinfectant in the distribution system, and in those cases where the State has indicated in writing that no unreasonable risk to health existed under the circumstances of this option. The turbidity measurements shall be made by the Nephelometric Method in accordance with the recommendations set forth in "Standard Methods for Examination of Water and Wastewater," American Public Health Association, 14th Edition, pp. 132-134; or "Methods of Chemical Analysis of Water and Wastes," EPA Environmental Monitoring and Support Laboratory, March 1979, Method 180.1—Nephelometric Method. Calibration of the turbidimeter shall be made either by the use of a formazin standard as specified in the cited references or a styrene divinylbenzene polymer standard (Amco-AEPA-1 Polymer) commercially available from Amco Standards International, Inc., 230 Polaris Avenue, No. C, Mountain View, California 94043.

(b) If the result of a turbidity analysis indicates that the maximum allowable limit has been exceeded, the sampling and measurement shall be confirmed by resampling as soon as practicable and preferably within one hour. If the repeat sample confirms that the maximum allowable limit has been exceeded, the supplier of water shall report to the State within 48 hours. The repeat sample shall be the sample used for the purpose of calculating the monthly average. If the monthly average of the daily samples exceeds the maximum allowable limit, or if the average of two samples taken on consecutive days exceeds 5 TU, the supplier of water shall report to the State and notify the public as directed in §§ 141.31 and 141.32.

(c) Sampling for non-community water systems shall begin within two years after the effective date of this part.

(d) The requirements of this § 141.22 shall apply only to public water systems which use water obtained in whole or in part from surface sources.

(e) The State has the authority to determine compliance or initiate enforcement action based upon analytical results or other information compiled by their sanctioned representatives and agencies.

[40 FR 59570, Dec. 24, 1975, as amended at 45 FR 57344, Aug. 27, 1980; 47 FR 8998, Mar. 3, 1982; 47 FR 10998, Mar. 12, 1982; 54 FR 27527, June 29, 1989]

Effective Date Note: At 54 FR 27527, June 29, 1989, § 141.22 was amended, adding introductory text, effective December 31, 1990.

§ 141.23 Inorganic chemical sampling and analytical requirements.

(a) Analyses for the purpose of determining compliance with § 141.11 are required as follows:

(1) Analyses for all community water systems utilizing surface water sources shall be completed within one year following the effective date of this part. These analyses shall be repeated at yearly intervals.

(2) Analyses for all community water systems utilizing only ground water sources shall be completed within two years following the effective date of this part. These analyses shall be repeated at three-year intervals.

(3) For non-community water systems, whether supplied by surface or ground sources, analyses for nitrate shall be completed by December 24, 1980. These analyses shall be repeated at intervals determined by the State.

(4) The State has the authority to determine compliance or initiate enforcement action based upon analytical results and other information compiled by their sanctioned representatives and agencies.

(b) If the result of an analysis made under paragraph (a) of (g) of this section indicates that the level of any contaminant listed in § 141.11 or § 141.62 exceeds the maximum contaminant level, the supplier of the water shall report to the State within 7 days and initiate three additional analyses at the same sampling point within one month.

(c) When the average of four analyses made pursuant to paragraph (b) of this section, rounded to the same number of significant figures as the maximum contaminant level for the substance in question, exceeds the maximum contaminant level, the supplier of water shall notify the State pursuant to § 141.31 and give notice to the public pursuant to § 141.32. Monitoring after public notification shall be at a frequency designated by the State and shall continue until the maximum contaminant level has not been exceeded in two successive samples or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

(d) The provisions of paragraphs (b) and (c) of this section notwithstanding, compliance with the maximum contaminant level for nitrate shall be determined on the basis of the mean of two analyses. When a level exceeding the maximum contaminant level for nitrate is found, a second analysis shall be initiated within 24 hours, and if the mean of the two analyses exceeds the maximum contaminant level, the supplier of water shall report his findings to the State pursuant to § 141.31 and shall notify the public pursuant to § 141.32.

(e) For the initial analyses required by paragraph (a)(1), (2) or (3) of this section, data for surface waters acquired within one year prior to the effective date and data for ground waters acquired within 3 years prior to the effective date of this part may be substituted at the discretion of the State.

(f) Analyses conducted to determine compliance with § 141.11 shall be made in accordance with the following methods, or their equivalent as determined by the Administrator.

(1) Arsenic-Method [1] 206.2, Atomic Absorption Furnance Technique; or

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[1] "Methods of Chemical Analysis of Water and Wastes," EPA Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268 (EPA-600/4-79-020), March 1979. Available from ORD Publications, *Continued*

Method[1] 206.3, or Method[4] D2972-78B or Method[2] 301.A VII, pp. 159-162, or Method[3] I-1062-78, pp. 61-63, Atomic Absorption-Gaseous Hydride; or Method[1] 206.4, or Method[4] D-2972-78A, or Method[2] 404-A and 404-B(4), Spectrophotometric, Silver Diethyldithiocarbamate; or Method[8] 200.7, Inductively Coupled Plasma Technique.

(2) Barium-Method[1] 208.1, or Method[2] 301-A IV, pp. 152-155, Atomic Absorption-Direct Aspiration; or Method[1] 208.2, Atomic Absorption Furnace Technique; or Method[8] 200.7, Inductively Coupled Plasma Technique.

(3) Cadmium-Method[1] 213.1 or Method[4] D 3557-78A or B, or Method[2] 301-A II or III, pp. 148-152, Atomic Absorption-Direct Aspiration; or Method[1] 213.2 Atomic Absorption Furnance Technique; or Method[8] 200.7, Inductively Coupled Plasma Technique.

(4) Chromium-Method[1] 218.1 or Method[4] D 1687-77D, or Method[2] 301-A II or III, pp. 148-152, Atomic Absorption-Direct Aspiration; or Chromium-Method[1] 218.2, Atomic Absorption Furnace Technique; or Method[8] 200.7, Inductively Coupled Plasma Technique.

(5) Lead-Method[1] 239.1, or Method[4] D 3559-78A or B, or Method[2] 301-A II or III, pp. 148-152, Atomic Absorption-Direct Aspiration; or Method[1] 239.2, Atomic Absorption Furnace Technique; or Method[8] 200.7, Inductively Coupled Plasma Technique.

(6) Mercury—Method[1] 245.1, or Method[4] D-3223-79, or Method[2] 301-A VI, pp. 156-159, Manual Cold Vapor Technique; or Method[1] 245.2, Automated Cold Vapor Technique.

(7) Nitrate—Method[1] 352.1, or Method[4] D-992-71, or Method[2] 419-D, pp. 427-429, Colorimetric Brucine; or Method[1] 353.3, or Method[4] D-3867-79B, or Method[2] 419-C, pp. 423-427, Spectrometric, Cadmium Reduction; Method[1] 353.1, Automated Hydrazine Reduction; or Method[1] 353.2, or Method[4] D-3867-79A, or Method[2] 605, pp. 620-624, Automated Cadmium Reduction.

(8) Selenium—Method[1] 270.2, Atomic Absorption Furnace Technique; or Method[1] 270.3; or Method[3] I-1667-78, pp. 237-239, or Method[4] D-3859-79, or Method[2] 301-A VII, pp. 159-162, Hydride Generation—Atomic Absorption Spectrophotometry.

(9) Silver-Method[1] 272.1, or Method[2] 301-A II, pp. 148-152, Atomic Absorption-Direct Aspiration; or Method[1] 272.2, Atomic Absorption Furnace Technique; or Method[8] 200.7, Inductively Coupled Plasma Technique.

(10) *Fluoride:*

Methodology	Reference (method number)			
	EPA[1]	ASTM[4]	SM[2]	Other
Colorimetric SPADNS; with distillation	340.1	D1179-72A	43 A and C	
Potentiometric ion selective electrode	340.2	D1179-72B	413 B	
Automated Alizarin fluoride blue; with distillation (complexone)	340.3		413 E	129-71W[8]

CERI, EPA, Cincinnati, Ohio 45268. For approved analytical procedures for metals, the technique applicable to total metals must be used.

[2] "Standard Methods for the Examination of Water and Wastewater." 14th Edition, American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1976.

[3] Techniques of Water-Resources Investigation of the United States Geological Survey, Chapter A-1, "Methods for Determination of Inorganic Substances in Water and Fluvial Sediments," Book 5, 1979, Stock #024-001-03177-9. Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

[4] Annual Book of ASTM Standards, part 31 Water, American Society for Testing and Materials, 1976 Race Street, Philadelphia, Pennsylvania 19103.

[5-7] [Reserved]

[8] "Inductively Coupled Plasma-Atomic Emission Spectrometic Method for Trace Element Analysis of Water and Wastes—Method 200.7" with Appendix to Method 200.7 entitled, "Inductively Coupled Plasma-Atomic Emission Analysis of Drinking Water," March 1987. Available from EPA's Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

Methodology	Reference (method number)			
	EPA [1]	ASTM [4]	SM [5]	Other
Automated ion selective electrode				380-75WE [7]

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[1] "Methods of Chemical Analysis of Water and Wastes," EPA Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268 (EPA-600/4-79-020), March 1979. Available from ORD Publications, CERI, EPA, Cincinnati, Ohio 45268. For approved analytical procedures for metals, the technique applicable to total metals must be used.

[2] [Reserved]

[3] [Reserved]

[4] Annual Book of ASTM Standards, part 31 Water, American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

[5] "Standard Methods for the Examination of Water and Wastewater," 16th Edition, American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1985.

[6] "Fluoride in Water and Wastewater. Industrial Method #129-71W." Technicon Industrial Systems. Tarrytown, New York, 10591. December 1972.

[7] "Fluoride in Water and Wastewater," Technicon Industrial Systems. Tarrytown New York, 10591, February 1976.

(g) *Fluoride.* In addition to complying with paragraphs (a) through (f) of this section, systems monitoring for fluoride must comply with the requirements of this paragraphs.

(1)(i) Where the system draws water from one source, the system shall take one sample at the entry point to the distribution system.

(ii) Where the system draws water from more than one source, the system must sample each source at the entry points to the distribution system.

(iii) If the system draws water from more than one source and sources are combined before distribution, the system must sample at an entry point to the distribution system during periods representative of the maximum fluoride levels occurring under normal operating conditions.

(2) The state may alter the frequencies for fluoride monitoring as set out in paragraph (a) of this section to increase or decrease such frequency considering the following factors:

(i) Reported concentrations from previously required monitoring,

(ii) The degree of variation in reported concentrations and,

(iii) Other factors which may affect fluoride concentrations such as changes in pumping rates in ground water supplies or significant changes in the system's configuration, operating procedures, source of water, and changes in stream flows.

(3) Monitoring may be decreased from the frequencies specified in paragraph (a) of this section upon application in writing by water systems if the state determines that the system is unlikely to exceed the MCL, considering the factors listed in paragraph (g)(2) of this section. Such determination shall be made in writing and set forth the basis for the determination. A copy of the determination shall be provided to the Administrator. In no case shall monitoring be reduced to less than one sample every 10 years. For systems monitoring once every 10 years, the state shall review the monitoring results every ten years to determine whether more frequent monitoring is necessary.

(4) Analyses for fluoride under this section shall only be used for determining compliance if conducted by laboratories that have analyzed Performance Evaluation samples to within ±10% of the reference value at fluoride concentrations from 1.0 mg/l to 10.0 mg/l, within the last 12 months.

(5) Compliance with the MCL shall be determined based on each sampling point. If any sampling point is determined to be out of compliance, the system is deemed to be out of compliance.

[40 FR 59570, Dec. 24, 1975, as amended at 45 FR 57344, Aug. 27, 1980; 47 FR 10998, Mar. 12, 1982; 51 FR 11410, Apr. 2, 1986; 51 FR 24329, July 3, 1986; 53 FR 5146, Feb. 19, 1988]

§ 141.24 Organic chemicals other than total trihalomethanes, sampling and analytical requirements.

(a) An analysis of substances for the purpose of determining compliance with § 141.12(a) and § 141.12(b) shall be made as follows:

(1) For all community water systems utilizing surface water sources, analyses shall be completed within one year following the effective date of this part. Samples analyzed shall be collected during the period of the year designated by the State as the period when contamination by pesticides is most likely to occur. These analyses shall be repeated at intervals specified by the State but in no event less frequently than at three year intervals.

(2) For community water systems utilizing only ground water sources, analyses shall be completed by those systems specified by the State.

(3) The State has the authority to determine compliance or initiate enforcement action based upon analytical results and other information compiled by their sanctioned representatives and agencies.

(b) If the result of an analysis made pursuant to paragraph (a) of this section indicates that the level of any contaminant listed in § 141.24 (a) and (b) exceeds the maximum contaminant level, the supplier of water shall report to the State within 7 days and initiate three additional analyses within one month.

(c) When the average of four analyses made pursuant to paragraph (b) of this section, rounded to the same number of significant figures as the maximum contaminant level for the substance in question, exceeds the maximum contaminant level, the supplier of water shall report to the State pursuant to § 141.31 and give notice to the public pursuant to § 141.32. Monitoring after public notification shall be at a frequency designated by the State and shall continue until the maximum contaminant level has not been exceeded in two successive samples or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

(d) For the initial analysis required by paragraphs (a) (1) and (2) of this section, data for surface water acquired within one year prior to the effective date of this part and data for ground water acquired within three years prior to the effective date of this part may be substituted at the discretion of the State.

(e) Analysis made to determine compliance with § 141.12(a) shall be made in accordance with the following methods, or their equivalent as determined by the Administrator: "Methods for Organochlorine Pesticides and Chlorophenoxy Acid Herbicides in Drinking Water and Raw Source Water," available from ORD Publications, CERI, EPA, Cincinnati, Ohio 45268; or "Organochlorine Pesticides in Water," Annual Book of ASTM Standards, part 31, Water, Method D-3086-79; or Method 509-A, pp. 555-565;[2] or Gas Chromatographic Methods for Analysis of Organic Substances in Water,[5] USGS, Book 5, Chapter A-3, pp. 24-39; or Solid Phase Extraction (SPE)[6] Test Method Number SPE-500 for EPA's "Methods for Organochlorine Pesticides and Chlorophenoxy Acid in Herbicides in Drinking Water and Raw Source Water."

(f) Analysis made to determine compliance with § 141.12(b) shall be conducted in accordance with "Methods for Organochlorine Pesticides and Chlorophenoxy Acid Herbicides in Drinking Water and Raw Source Water," available from ORD Publications, CERI, EPA, Cincinnati, Ohio 45268; or "Chlorinated Phenoxy Acid Herbicides in Water," Annual Book of ASTM Standards, part 31, Method D-3478-79; or Method 509-B, pp. 565-569;[2] or Gas Chromatographic Methods for Analysis of Organic Substances in Water,[5] USGS, Book 5, Chapter A-3, pp. 24-39.

(g) Analysis of the contaminants listed in § 141.61(a) for purposes of determining compliance with the maximum contaminant levels shall be conducted as follows:

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[2] See footnote 2 to § 141.23.

[5] Techniques of Water-Resources Investigation of the United States Geological Survey, Chapter A-3, "Methods for Analysis of Organic Substances in Water," Book 5, 1971, Stock #2401-1227. Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC.

[6] Solid Phase Extraction (SPE) Test Method Number SPE-550 is available from J.T. Baker Chemical Company, 22 Red School Lane, Phillipsburg, New Jersey 08865.

(1) Ground-water systems shall sample at points of entry to the distribution system representative of each well after any application of treatment. Sampling must be conducted at the same location(s) or more representative location(s) every three months for one year except as provided in paragraph (g)(8)(i) of this section.

(2) Surface water systems shall sample at points in the distribution system representative of each source or at entry points to the distribution system after any application of treatment. Surface water systems must sample each source every three months except as provided in paragraph (g)(8)(ii) of this section. Sampling must be conducted at the same location or a more representative location each quarter.

(3) If the system draws water from more than one source and sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions.

(4) All community water systems and non-transient, non-community water systems serving more than 10,000 people shall analyze all distribution or entry-point samples, as appropriate, representing all source waters beginning no later than January 1, 1988. All community water systems and non-transient non-community water systems serving from 3,300 to 10,000 people shall analyze all distribution or entry-point samples, as required in this paragraph (g), representing source waters no later than January 1, 1989. All other community and non-transient, non-community water systems shall analyze distribution or entry-point samples, as required in this paragraph (g), representing all source waters beginning no later than January 1, 1991.

(5) The State or EPA may require confirmation samples for positive or negative results. If a confirmation sample(s) is required by EPA or the State, then the sample result(s) should be averaged with the first sampling result and used for compliance determination in accordance with (g)(9) of this section. States have discretion to delete results of obvious sampling errors from this calculation.

(6) Analysis for vinyl chloride is required only for ground water systems that have detected one or more of the following two-carbon organic compounds: Trichloroethylene, tetrachloroethylene, 1,2-dichloroethane, 1,1,1-trichloroethane, cis-1,2-dichloroethylene, trans-1,2-dichloroethylene, or 1,1-dichloroethylene. The analysis for vinyl chloride is required at each distribution or entry point at which one or more of the two-carbon organic compounds were found. If the first analysis does not detect vinyl chloride, the State may reduce the frequency of vinyl chloride monitoring to once every three years for that sample location or other sample locations which are more representative of the same source. Surface water systems may be required to analyze for vinyl chloride at the discretion of the State.

(7) A State or individual public water systems may choose to composite up to five samples from one or more public water systems. Compositing of samples is to be done in the laboratory by the procedures listed below. Samples must be analyzed within fourteen days of collection. If any organic contaminant listed in § 141.61(a) VOC is detected in the original composite sample, a sample from each source that made up the composite sample must be reanalyzed individually within fourteen days from sampling. The sample for reanalysis cannot be the original sample but can be a duplicate sample. If duplicates of the original samples are not available, new samples must be taken from each source used in the original composite and analyzed for VOCs. Reanalysis must be accomplished within fourteen days of the second sample. To composite samples, the following procedure must be followed:

(i) Compositing samples prior to GC analysis.

(A) Add 5 ml or equal larger amounts of each sample (up to 5 samples are allowed) to a 25 ml glass syringe. Special precautions must be made to maintain zero headspace in the syringe.

(B) The samples must be cooled at 4° C during this step to minimize volatilization losses.

(C) Mix well and draw out a 5-ml aliquot for analysis.

(D) Follow sample introduction, purging, and desorption steps described in the method.

(E) If less than five samples are used for compositing, a proportionately smaller syringe may be used.

(ii) Compositing samples prior to GC/MS analysis.

(A) Inject 5-ml or equal larger amounts of each aqueous sample (up to 5 samples are allowed) into a 25-ml purging device using the sample introduction technique described in the method.

(B) The total volume of the sample in the purging device must be 25 ml.

(C) Purge and desorb as described in the method.

(8) The State may reduce the monitoring frequency specified in paragraphs (g) (1) and (2) of this section, as explained in this paragraph:

(i) The monitoring frequency for ground-water systems is as follows:

(A) When VOCs are not detected in the first sample (or any subsequent samples that may be taken) and the system is not vulnerable as defined in paragraph (g)(8)(iv) of this section, monitoring may be reduced to one sample and must be repeated every 5 years.

(B) When VOCs are not detected in the first sample (or any subsequent sample that may be taken) and the system is vulnerable as defined in paragraph (g)(8)(iv) of this section,

(*1*) Monitoring (i.e., one sample) must be repeated every 3 years for systems >500 connections.

(*2*) Monitoring (i.e., one sample) must be repeated every 5 years for system <500 connections.

(C) If VOCs are detected in the first sample (or any subsequent sample that may be taken), regardless of vulnerability, monitoring must be repeated every 3 months, as required under paragraph (g)(1) of this section.

(ii) The repeat monitoring frequency for surface water systems is as follows:

(A) When VOCs are not detected in the first year of quarterly sampling (or any other subsequent sample that may be taken) and the system is not vulnerable as defined in paragraph (g)(8)(iv), monitoring is only required at state discretion.

(B) When VOCs are not detected in the first year of quarterly sampling (or any other subsequent sample that may be taken) and the system is vulnerable as defined in paragraph (g)(8)(iv) of this section,

(*1*) Monitoring must be repeated every three years (for systems >500 connections.)

(*2*) Monitoring must be repeated every five years (for systems <500 connections.)

(C) When VOCs are detected in the first year of quarterly sampling (or any other subsequent sample that may be taken), regardless of vulnerability, monitoring must be repeated every 3 months, as required under paragraph (g)(2) of this section.

(iii) States may reduce the frequency of monitoring to once per year for a ground-water system or surface water system detecting VOCs at levels consistently less than the MCL for three consecutive years.

(iv) Vulnerability of each public water system shall be determined by the State based upon an assessment of the following factors:

(A) Previous monitoring results.

(B) Number of persons served by public water system.

(C) Proximity of a smaller system to a larger system.

(D) Proximity to commercial or industrial use, disposal, or storage of Volatile Synthetic Organic Chemicals.

(E) Protection of the water source.

(v) A system is deemed to be vulnerable for a period of three years after any positive measurement of one or more contaminants listed in § 141.40 (e) or (j) or § 141.61(a), except for trihalomethanes or other demonstrated disinfection by-products.

(9) Compliance with § 141.61(a) shall be determined based on the results of running annual average of quarterly sampling for each sampling location. If one location's average is greater than the MCL, then the system shall be deemed to be out of compliance. If a public water system has a distribution system separable from other parts of the distribution system with no

interconnections, only that part of the system that exceeds any MCL as specified in § 141.61(a) will be deemed out of compliance. States may reduce the public notice requirement to that portion of the system which is out of compliance. If any one sample result would cause the annual average to be exceeded, then the system shall be deemed to be out of compliance immediately. For systems that only take one sample per location because no VOCs were detected, compliance shall be based on that one sample.

(10) Analysis under this paragraph shall be conducted using the following EPA methods or their equivalent as approved by EPA. These methods are contained in "Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water," September 1986, available from Environmental and Support Laboratory (EMSL), EPA, Cincinnati, OH 45268 or the State.

(i) Method 502.1, "Volatile Halogenated Organic Chemicals in Water by Purge and Trap Gas Chromatography."

(ii) Method 503.1, "Volatile Aromatic and Unsaturated Organic Compounds in Water by Purge and Trap Gas Chromatography."

(iii) Method 524.1, "Volatile Organic Compounds in Water by Purge and Trap Gas Chromatography/Mass Spectrometry."

(iv) Method 524.2, "Volatile Organic Compounds in Water by Purge and Trap Capillary Column Gas Chromatography/Mass Spectrometry."

(v) Method 502.2, "Volatile Organic Compounds in Water by Purge and Trap Capillary Gas Chromatography with Photoionization and Electrolytic Conductivity Detectors in Series."

(11) Analysis under this section shall only be conducted by laboratories that have received conditional approval by EPA or the State according to the following conditions:

(i) To receive conditional approval to conduct analyses for benzene, vinyl chloride, carbon tetrachloride, 1,2-dichloroethane, trichloroethylene, 1,1-dichloroethylene, 1,1,1-trichloroethane, and paradichlorobenzene the laboratory must:

(A) Analyze Performance Evaluation samples which include these substances provided by EPA Environmental Monitoring and Support Laboratory or equivalent samples provided by the State.

(B) Achieve the quantitative acceptance limits under paragraphs (g)(11)(i)(C) and (g)(11)(i)(D) of this section for at least six of the seven subject organic chemicals. States may allow fewer than six of the seven.

(C) Achieve quantitative results on the analyses performed under (g)(11)(i)(A) that are within ±20 percent of the actual amount of the substances in the Performance Evaluation sample when the actual amount is greater than or equal to 0.010 mg/l.

(D) Achieve quantitative results on the analyses performed under (g)((11)(i)(A) of this section that are within ±40 percent of the actual amount of the substances in the Performance Evaluation sample when the active amount is less than 0.010 mg/l.

(E) Achieve a method detection limit of 0.0005 mg/l, according to the procedures in Appendix B of Part 136.

(F) Be currently approved by EPA or the State for the analyses of trihalomethanes under § 141.30.

(ii) To receive conditional approval for vinyl chloride, the laboratory must:

(A) Analyze Performance Evaluation samples provided by EPA Envionmental Monitoring and Support Laboratory or equivalent samples provided by the State.

(B) Achieve quantitative results on the analyses performed under (g)(11)(ii)(A) of this section that are within ±40 percent of the actual amount of vinyl chloride in the Performance Evaluation sample.

(C) Achieve a method detection limit of 0.0005 mg/l, according to the procedures in Appendix B of Part 136.

(D) Receive approval or be currently approved by EPA or the State under (g)(11)(i) of this section.

(12) States have the authority to allow the use of monitoring data collected after January 1, 1983, for purposes of monitoring compliance. If the data is consistent with the other requirements in this paragraph, States may use that data to represent the ini-

tial monitoring if the system is determined by the State not to be vulnerable under the requirements of this section. In addition, the results of EPA's Ground Water Supply Survey can be used in a similar manner for systems supplied by a single well.

(13) States may increase required monitoring where necessary to detect variations within the system.

(14) The State has the authority to determine compliance or initiate enforcement action based upon analytical results and other information compiled by their sanctioned representatives and agencies.

(15) Each approved laboratory must determine the method detection limit (MDL), as defined in Appendix B to Part 136, at which it is capable of detecting VOCs. The acceptable MDL is 0.0005 mg/l. This concentration is the detection level for purposes of paragraphs (g) (5), (6), (7), and (8) of this section.

(Approved by the Office of Management and Budget under control number 2040-0090)

[40 FR 59570, Dec. 24, 1975, as amended at 44 FR 68641, Nov. 29, 1979; 45 FR 57345, Aug. 27, 1980; 47 FR 10998, Mar. 12, 1982; 52 FR 25712, July 8, 1987; 53 FR 5147, Feb. 19, 1988; 53 FR 25110, July 1, 1988]

§ 141.25 Analytical methods for radioactivity.

(a) The methods specified in *Interim Radiochemical Methodology for Drinking Water*, Environmental Monitoring and Support Laboratory, EPA-600/4-75-008, USEPA, Cincinnati, Ohio 45268, or those listed below, are to be used to determine compliance with §§ 141.15 and 141.16 (radioactivity) except in cases where alternative methods have been approved in accordance with § 141.27.

(1) Gross Alpha and Beta—Method 302 "Gross Alpha and Beta Radioactivity in Water" *Standard Methods for the Examination of Water and Wastewater*, 13th Edition, American Public Health Association, New York, NY., 1971.

(2) Total Radium—Method 304 "Radium in Water by Precipitation" Ibid.

(3) Radium-226—Method 305 "Radium-226 by Radon in Water" Ibid.

(4) Strontium-89,90 — Method 303 "Total Strontium and Strontium-90 in Water" Ibid.

(5) Tritium—Method 306 "Tritium in Water" Ibid.

(6) Cesium-134 — ASTM D-2459 "Gamma Spectrometry in Water," *1975 Annual Book of ASTM Standards, Water and Atmospheric Analysis*, Part 31, American Society for Testing and Materials, Philadelphia, PA. (1975).

(7) Uranium—ASTM D-2907 "Microquantities of Uranium in Water by Fluorometry," Ibid.

(b) When the identification and measurement of radionuclides other than those listed in paragraph (a) of this section is required, the following references are to be used, except in cases where alternative methods have been approved in accordance with § 141.27.

(1) *Procedures for Radiochemical Analysis of Nuclear Reactor Aqueous Solutions*, H. L. Krieger and S. Gold, EPA-R4-73-014. USEPA, Cincinnati, Ohio, May 1973.

(2) *HASL Procedure Manual*, Edited by John H. Harley. HASL 300, ERDA Health and Safety Laboratory, New York, NY., 1973.

(c) For the purpose of monitoring radioactivity concentrations in drinking water, the required sensitivity of the radioanalysis is defined in terms of a detection limit. The detection limit shall be that concentration which can be counted with a precision of plus or minus 100 percent at the 95 percent confidence level (1.96σ where σ is the standard deviation of the net counting rate of the sample).

(1) To determine compliance with § 141.15(a) the detection limit shall not exceed 1 pCi/1. To determine compliance with § 141.15(b) the detection limit shall not exceed 3 pCi/1.

(2) To determine compliance with § 141.16 the detection limits shall not exceed the concentrations listed in Table B.

TABLE B—DETECTION LIMITS FOR MAN-MADE BETA PARTICLE AND PHOTON EMITTERS

Radionuclide	Detection limit
Tritium	1,000 pCi/1.
Strontium-89	10 pCi/1.
Strontium-90	2 pCi/1.
Iodine-131	1 pCi/1.
Cesium-134	10 pCi/1.
Gross beta	4 pCi/1.
Other radionuclides	1/10 of the applicable limit.

(d) To judge compliance with the maximum contaminant levels listed in §§ 141.15 and 141.16, averages of data shall be used and shall be rounded to the same number of significant figures as the maximum contaminant level for the substance in question.

(e) The State has the authority to determine compliance or initiate enforcement action based upon analytical results or other information compiled by their sanctioned representatives and agencies.

[41 FR 28404, July 9, 1976, as amended at 45 FR 57345, Aug. 27, 1980]

§ 141.26 Monitoring frequency for radioactivity in community water systems.

(a) Monitoring requirements for gross alpha particle activity, radium-226 and radium-228.

(1) Initial sampling to determine compliance with § 141.15 shall begin within two years of the effective date of these regulations and the analysis shall be completed within three years of the effective date of these regulations. Compliance shall be based on the analysis of an annual composite of four consecutive quarterly samples or the average of the analyses of four samples obtained at quarterly intervals.

(i) A gross alpha particle activity measurement may be substituted for the required radium-226 and radium-228 analysis *Provided*, That the measured gross alpha particle activity does not exceed 5 pCi/1 at a confidence level of 95 percent (1.65σ where σ is the standard deviation of the net counting rate of the sample). In localities where radium-228 may be present in drinking water, it is recommended that the State require radium-226 and/or radium-228 analyses when the gross alpha particle activity exceeds 2 pCi/1.

(ii) When the gross alpha particle activity exceeds 5 pCi/1, the same or an equivalent sample shall be analyzed for radium-226. If the concentration of radium-226 exceeds 3 pCi/1 the same or an equivalent sample shall be analyzed for radium-228.

(2) For the initial analysis required by paragraph (a)(1) of this section, data acquired within one year prior to the effective date of this part may be substituted at the discretion of the State.

(3) Suppliers of water shall monitor at least once every four years following the procedure required by paragraph (a)(1) of this section. At the discretion of the State, when an annual record taken in conformance with paragraph (a)(1) of this section has established that the average annual concentration is less than half the maximum contaminant levels established by § 141.15, analysis of a single sample may be substituted for the quarterly sampling procedure required by paragraph (a)(1) of this section.

(i) More frequent monitoring shall be conducted when ordered by the State in the vicinity of mining or other operations which may contribute alpha particle radioactivity to either surface or ground water sources of drinking water.

(ii) A supplier of water shall monitor in conformance with paragraph (a)(1) of this section within one year of the introduction of a new water source for a community water system. More frequent monitoring shall be conducted when ordered by the State in the event of possible contamination or when changes in the distribution system or treatment processing occur which may increase the concentration of radioactivity in finished water.

(iii) A community water system using two or more sources having different concentrations of radioactivity shall monitor source water, in addition to water from a free-flowing tap, when ordered by the State.

(iv) Monitoring for compliance with § 141.15 after the initial period need not include radium-228 *except when* required by the State, *Provided*, That the average annual concentration of radium-228 has been assayed at least once using the quarterly sampling procedure required by paragraph (a)(1) of this section.

(v) Suppliers of water shall conduct annual monitoring of any community water system in which the radium-226 concentration exceeds 3 pCi/1, when ordered by the State.

(4) If the average annual maximum contaminant level for gross alpha particle activity or total radium as set forth in § 141.15 is exceeded, the supplier of a community water system shall give notice to the State pursuant to § 141.31 and notify the public as required by § 141.32. Monitoring at quarterly intervals shall be continued until the annual average concentration no longer exceeds the maximum contaminant level or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

(b) Monitoring requirements for manmade radioactivity in community water systems.

(1) Within two years of the effective date of this part, systems using surface water sources and serving more than 100,000 persons and such other community water systems as are designated by the State shall be monitored for compliance with § 141.16 by analysis of a composite of four consecutive quarterly samples or analysis of four quarterly samples. Compliance with § 141.16 may be assumed without further analysis if the average annual concentration of gross beta particle activity is less than 50 pCi/1 and if the average annual concentrations of tritium and strontium-90 are less than those listed in Table A, *Provided,* That if both radionuclides are present the sum of their annual dose equivalents to bone marrow shall not exceed 4 millirem/year.

(i) If the gross beta particle activity exceeds 50 pCi/1, an analysis of the sample must be performed to identify the major radioactive constituents present and the appropriate organ and total body doses shall be calculated to determine compliance with § 141.16.

(ii) Suppliers of water shall conduct additional monitoring, as ordered by the State, to determine the concentration of man-made radioactivity in principal watersheds designated by the State.

(iii) At the discretion of the State, suppliers of water utilizing only ground waters may be required to monitor for man-made radioactivity.

(2) For the initial analysis required by paragraph (b)(1) of this section data acquired within one year prior to the effective date of this part may be substituted at the discretion of the State.

(3) After the initial analysis required by paragraph (b)(1) of this section suppliers of water shall monitor at least every four years following the procedure given in paragraph (b)(1) of this section.

(4) Within two years of the effective date of these regulations the supplier of any community water system designated by the State as utilizing waters contaminated by effluents from nuclear facilities shall initiate quarterly monitoring for gross beta particle and iodine-131 radioactivity and annual monitoring for strontium-90 and tritium.

(i) Quarterly monitoring for gross beta particle activity shall be based on the analysis of monthly samples or the analysis of a composite of three monthly samples. The former is recommended. If the gross beta particle activity in a sample exceeds 15 pCi/1, the same or an equivalent sample shall be analyzed for strontium-89 and cesium-134. If the gross beta particle activity exceeds 50 pCi/1, an analysis of the sample must be performed to identify the major radioactive constituents present and the appropriate organ and total body doses shall be calculated to determine compliance with § 141.16.

(ii) For iodine-131, a composite of five consecutive daily samples shall be analyzed once each quarter. As ordered by the State, more frequent monitoring shall be conducted when iodine-131 is identified in the finished water.

(iii) Annual monitoring for strontium-90 and tritium shall be conducted by means of the analysis of a composite of four consecutive quarterly samples or analysis of four quarterly samples. The latter procedure is recommended.

(iv) The State may allow the substitution of environmental surveillance data taken in conjunction with a nuclear facility for direct monitoring of manmade radioactivity by the supplier of water where the State determines such data is applicable to a particular community water system.

(5) If the average annual maximum contaminant level for man-made radioactivity set forth in § 141.16 is exceeded, the operator of a community water system shall give notice to the State pursuant to § 141.31 and to the public as required by § 141.32. Monitoring at monthly intervals shall be continued until the concentration no longer exceeds the maximum contaminant level or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

[41 FR 28404, July 9, 1976]

§ 141.27 Alternate analytical techniques.

(a) With the written permission of the State, concurred in by the Administrator of the U.S. EPA, an alternate analytical technique may be employed. An alternate technique shall be accepted only if it is substantially equivalent to the prescribed test in both precision and accuracy as it relates to the determination of compliance with any MCL. The use of the alternate analytical technique shall not decrease the frequency of monitoring required by this part.

[45 FR 57345, Aug. 27, 1980]

§ 141.28 Approved laboratories.

(a) For the purpose of determining compliance with §§ 141.21 through 141.27, 141.41 and 141.42, samples may be considered only if they have been analyzed by a laboratory approved by the State except that measurements for turbidity, free chlorine residual, temperature and pH may be performed by any person acceptable to the State.

(b) Nothing in this part shall be construed to preclude the State or any duly designated representative of the State from taking samples or from using the results from such samples to determine compliance by a supplier of water with the applicable requirements of this part.

[45 FR 57345, Aug. 27, 1980; 47 FR 10999, Mar. 12, 1982]

§ 141.29 Monitoring of consecutive public water systems.

When a public water system supplies water to one or more other public water systems, the State may modify the monitoring requirements imposed by this part to the extent that the interconnection of the systems jusifies treating them as a single system for monitoring purposes. Any modified monitoring shall be conducted pursuant to a schedule specified by the State and concurred in by the Administrator of the U.S. Environmental Protection Agency.

§ 141.30 Total trihalomethanes sampling, analytical and other requirements.

(a) Community water system which serve a population of 10,000 or more individuals and which add a disinfectant (oxidant) to the water in any part of the drinking water treatment process shall analyze for total trihalomethanes in accordance with this section. For systems serving 75,000 or more individuals, sampling and analyses shall begin not later than 1 year after the date of promulgation of this regulation. For systems serving 10,000 to 74,999 individuals, sampling and analyses shall begin not later than 3 years after the date of promulgation of this regulation. For the purpose of this section, the minimum number of samples required to be taken by the system shall be based on the number of treatment plants used by the system, except that multiple wells drawing raw water from a single aquifer may, with the State approval, be considered one treatment plant for determining the minimum number of samples. All samples taken within an established frequency shall be collected within a 24-hour period.

(b)(1) For all community water systems utilizing surface water sources in whole or in part, and for all community water systems utilizing only ground water sources that have not been determined by the State to qualify for the monitoring requirements of paragraph (c) of this section, analyses for total trihalomethanes shall be performed at quarterly intervals on at least four water samples for each treatment plant used by the system. At least 25 percent of the samples shall be taken at locations within the distribution system reflecting the maximum residence time of the water in the system. The remaining 75 percent shall be taken at representative locations in the distribution system, taking into account number of persons served, different sources of water and different treatment methods employed. The results of all analyses per quarter shall be arithmetically averaged and reported to the State within 30 days of the system's receipt of such results. Results shall also be reported to EPA until such monitoring requirements have been adopted by the State. All samples collected shall be used in the computation of the average, unless the analytical results are invalidated for technical reasons. Sampling and analyses shall be conducted in accordance with the methods listed in paragraph (e) of this section.

(2) Upon the written request of a community water system, the monitoring frequency required by paragraph (b)(1) of this section may be reduced by the State to a minimum of one sample analyzed for TTHMs per quarter taken at a point in the distribution system reflecting the maximum residence time of the water in the system, upon a written determination by the State that the data from at least 1 year of monitoring in accordance with paragraph (b)(1) of this section and local conditions demonstrate that total trihalomethane concentrations will be consistently below the maximum contaminant level.

(3) If at any time during which the reduced monitoring frequency prescribed under this paragraph applies, the results from any analysis exceed 0.10 mg/l of TTHMs and such results are confirmed by at least one check sample taken promptly after such results are received, or if the system makes any significant change to its source of water or treatment program, the system shall immediately begin monitoring in accordance with the requirements of paragraph (b)(1) of this section, which monitoring shall continue for at least 1 year before the frequency may be reduced again. At the option of the State, a system's monitoring frequency may and should be increased above the minimum in those cases where it is necessary to detect variations of TTHM levels within the distribution system.

(c)(1) Upon written request to the State, a community water system utilizing only ground water sources may seek to have the monitoring frequency required by paragraph (b)(1) of this section reduced to a minimum of one sample for maximum TTHM potential per year for each treatment plant used by the system taken at a point in the distribution system reflecting maximum residence time of the water in the system. The system shall submit to the State the results of at least one sample analyzed for maximum TTHM potential for each treatment plant used by the system taken at a point in the distribution system reflecting the maximum residence time of the water in the system. The system's monitoring frequency may only be reduced upon a written determination by the State that, based upon the data submitted by the system, the system has a maximum TTHM potential of less than 0.10 mg/l and that, based upon an assessment of the local conditions of the system, the system is not likely to approach or exceed the maximum contaminant level for total TTHMs. The results of all analyses shall be reported to the State within 30 days of the system's receipt of such results. Results shall also be reported to EPA until such monitoring requirements have been adopted by the State. All samples collected shall be used for determining whether the system must comply with the monitoring requirements of paragraph (b) of this section, unless the analytical results are invalidated for technical reasons. Sampling and analyses shall be conducted in accordance with the methods listed in paragraph (e) of this section.

(2) If at any time during which the reduced monitoring frequency prescribed under paragraph (c)(1) of this section applies, the results from any analysis taken by the system for maximum TTHM potential are equal to or

greater than 0.10 mg/l, and such results are confirmed by at least one check sample taken promptly after such results are received, the system shall immediately begin monitoring in accordance with the requirements of paragraph (b) of this section and such monitoring shall continue for at least one year before the frequency may be reduced again. In the event of any significant change to the system's raw water or treatment program, the system shall immediately analyze an additional sample for maximum TTHM potential taken at a point in the distribution system reflecting maximum residence time of the water in the system for the purpose of determining whether the system must comply with the monitoring requirements of paragraph (b) of this section. At the option of the State, monitoring frequencies may and should be increased above the minimum in those cases where this is necessary to detect variation of TTHM levels within the distribution system.

(d) Compliance with § 141.12(c) shall be determined based on a running annual average of quarterly samples collected by the system as prescribed in paragraph (b)(1) or (2) of this section. If the average of samples covering any 12 month period exceeds the Maximum Contaminant Level, the supplier of water shall report to the State pursuant to § 141.31 and notify the public pursuant to § 141.32. Monitoring after public notification shall be at a frequency designated by the State and shall continue until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

(e) Sampling and analyses made pursuant to this section shall be conducted by one of the following EPA approved methods:

(1) "The Analysis of Trihalomethanes in Drinking Waters by the Purge and Trap Method," Method 501.1, EMSL, EPA Cincinnati, Ohio.

(2) "The Analysis of Trihalomethanes in Drinking Water by Liquid/Liquid Extraction," Method 501.2, EMSL, EPA Cincinnati, Ohio.

Samples for TTHM shall be dechlorinated upon collection to prevent further production of Trihalomethanes, according to the procedures described in the above two methods. Samples for maximum TTHM potential should not be dechlorinated, and should be held for seven days at 25° C (or above) prior to analysis, according to the procedures described in the above two methods.

(f) Before a community water system makes any significant modifications to its existing treatment process for the purposes of achieving compliance with § 141.12(c), such system must submit and obtain State approval of a detailed plan setting forth its proposed modification and those safeguards that it will implement to ensure that the bacteriological quality of the drinking water served by such system will not be adversely affected by such modification. Each system shall comply with the provisions set forth in the State-approved plan. At a minimum, a State approved plan shall require the system modifying its disinfection practice to:

(1) Evaluate the water system for sanitary defects and evaluate the source water for biological quality;

(2) Evaluate its existing treatment practices and consider improvements that will minimize disinfectant demand and optimize finished water quality throughout the distribution system;

(3) Provide baseline water quality survey data of the distribution system. Such data should include the results from monitoring for coliform and fecal coliform bacteria, fecal streptococci, standard plate counts at 35° C and 20° C, phosphate, ammonia nitrogen and total organic carbon. Virus studies should be required where source waters are heavily contaminated with sewage effluent;

(4) Conduct additional monitoring to assure continued maintenance of optimal biological quality in finished water, for example, when chloramines are introduced as disinfectants or when pre-chlorination is being discontinued. Additional monitoring should also be required by the State for chlorate, chlorite and chlorine dioxide when chlorine dioxide is used. Standard plate count analyses should also be required by the State as appropriate before and after any modifications

(5) Consider inclusion in the plan of provisions to maintain an active disinfectant residual throughout the distribution system at all times during and after the modification.

[44 FR 68641, Nov. 29, 1979, as amended at 45 FR 15545, 15547, Mar. 11, 1980]

APPENDIX A—SUMMARY OF PUBLIC COMMENTS AND EPA RESPONSES ON PROPOSED AMENDMENTS TO THE NATIONAL INTERIM PRIMARY DRINKING WATER REGULATIONS FOR CONTROL OF TRIHALOMETHANES IN DRINKING WATER

[44 FR 68642, Nov. 29, 1979]

APPENDIX B—SUMMARY OF MAJOR COMMENTS (FOR RESPONSES, SEE APPENDIX A)

[44 FR 68666, Nov. 29, 1979]

EDITORIAL NOTE: Appendices A and B appearing at 44 FR 68642 and 68666, Nov. 29, 1979, are not codified in the Code of Federal Regulations.

APPENDIX C—ANALYSIS OF TRIHALOMETHANES

PART I—THE ANALYSIS OF TRIHALOMETHANES IN DRINKING WATER BY THE PURGE AND TRAP METHOD

1. Scope

1.1 This method (1) is applicable in the determination of four trihalomethanes, i.e. chloroform, dichlorobromomethane, dibromochloromethane, and bromoform in finished drinking water, raw source water, or drinking water in any stage of treatment. The concentration of these four compounds is totaled to determine total trihalomethanes (TTHM).

1.2 For compounds other than the abovementioned trihalomethanes, or for other sample sources, the analyst must demonstrate the usefulness of the method by collecting precision and accuracy data on actual samples as described (2).

1.3 Although the actual detection limits are highly dependent upon the gas chromatographic column and detector employed, the method can be used over a concentration range of approximately 0.5 to 1500 micrograms per liter.

1.4 Well in excess of 100 different water supplies have been analyzed using this method. Supplementary analyses using gas chromatography mass spectrometry (GC/MS) have shown that there is no evidence of interference in the determination of trihalomethanes (3). For this reason, it is not necessary to analyze the raw source water as is required with the Liquid/Liquid Extraction Method (4).

2. Summary

2.2 Trihalomethanes are extracted by an inert gas which is bubbled through the aqueous sample. The trihalomethanes, along with other organic constituents which exhibit low water solubility and a vapor pressure significantly greater than water, are efficiently transferred from the aqueous phase to the gaseous phase. These compounds are swept from the purging device and are trapped in a short column containing a suitable sorbent. After a predetermined period of time, the trapped components are thermally desorbed and backflushed onto the head of a gas chromatographic column and separated under programmed conditions. Measurement is accomplished with a halogen specific detector such as electrolytic conductivity or microcoulometric titration.

2.3 Confirmatory analyses are performed using dissimilar columns, or by mass spectrometry (5).

2.4 Aqueous standards and unknowns are extracted and analyzed under identical conditions in order to compensate for extraction losses.

2.5 The total analysis time, assuming the absence of other organohalides, is approximately 35 minutes per sample.

3. Interferences

3.1 Impurities contained in the purge gas and organic compounds outgasing from the plumbing ahead of the trap usually account for the majority of contamination problems. The presence of such inteferences are easily monitored as a part of the quality control program. Sample blanks are normally run between each set of samples. When a positive trihalomethane response is noted in the sample blank, the analyst should analyze a method blank. Method blanks are run by charging the purging device with organic-free water and analyzing in the normal manner.

If any trihalomethane is noted in the method blank in excess of 0.4 μg/l, the analyst should change the purge gas source and regenerate the molecular sieve purge gas filter. *Subtracting the blank values is not recommended.* The use of non-TFE plastic tubing, non-TFE thread sealants, or flow controllers with rubber components should be avoided since such materials generally out-gas organic compounds which will be concentrated in the trap during the purge operation. Such out-gasing problems are common whenever new equipment is put into service; as time progresses, minor outgasing problems generally cure themselves.

3.2 Several instances of accidental sample contamination have been noted and attributed to diffusion of volatile organics through the septum seal and into the sample during shipment and storage. The sample blank is used as a monitor for this problem.

3.3 For compounds that are not efficiently purged, such as bromoform, small variations in sample volume, purge time, purge flow rate, or purge temperature can affect the analytical result. Therefore, samples and standards must be analyzed under identical conditions.

3.4 Cross-contamination can occur whenever high-level and low-level samples are sequentially analyzed. To reduce this likelihood, the purging device and sample syringe should be rinsed twice between samples with organic-free water. Whenever an unusually concentrated sample is encountered, it is highly recommended that it be followed by a sample blank analysis to ensure that sample cross contamination does not occur. For samples containing large amounts of water soluble materials, it may be necessary to wash out the purging device with a soap solution, rinse with distilled water, and then dry in a 105°C oven between analyses.

3.5 Qualitative misidentifications are a problem in using gas chromatographic analysis. Whenever samples whose qualitative nature is unknown are analyzed, the following precautionary measures should be incorporated into the analysis.

3.5.1 Perform duplicate analyses using the two recommended columns (4.2.1 and 4.2.2) which provide different retention order and retention times for the trihalomethanes and other organohalides.

3.5.2 Whenever possible, use GC/MS techniques which provide unequivocal qualitative identifications (5).

4. Apparatus

4.1 The purge and trap equipment consists of three separate pieces of apparatus: the purging device, trap, and desorber. Construction details for a purging device and an easily automated trap-desorber hybrid which has proven to be exceptionally efficient and reproducible are shown in Figures 1 through 4 and described in 4.1.1. through 4.1.3. An earlier acceptable version of the above-mentioned equipment is described in (1).

4.1.1 Purging Device—Construction details are given in Figure 1 for an all-glass 5 ml purging device. The glass frit installed at the base of the sample chamber allows finely divided gas bubbles to pass through the sample while the sample is restrained above the frit. Gaseous volumes above the sample are kept to a minimum to eliminate dead volume effects, yet allowing sufficient space for most foams to disperse. The inlet and exit ports are constructed from heavy-walled ¼-inch glass tubing so that leak-free removable connections can be made using "finger-tight" compression fittings containing Teflon ferrules. The removable foam trap is used to control samples that foam.

4.1.2 Trapping Device—The trap (Figure 2) is a short gas chromatographic column which at <35° C retards the flow of the compounds of interest while venting the purge gas and, depending on which sorbent is used, much of the water vapor. The trap should be constructed with a low thermal mass so that it can be heated to 180° C in less than 1 minute for efficient desorption, then rapidly cooled to room temperature for recycling. Variations in the trap ID, wall thickness, sorbents, sorbent packing order, and sorbent mass could adversely affect the trapping and desorption efficiencies for compounds discussed in this text. For this reason, it is important to faithfully reproduce the trap configurations recommended in Figure 2. Traps containing Tenax only, or combinations of Tenax and other sorbents are acceptable for this analysis.

4.1.3 Desorber assembly—Details for the desorber are shown in Figures 3, and 4. With the 6-port valve in the Purge Sorb position (Figure 3), the effluent from the purging device passes through the trap where the flow rate of the organics is retarded. The GC carrier gas also passes through the 6-port valve and is returned to the GC. With the 6-port valve in the Purge-Sorb position, the operation of the GC is in no way impaired; therefore, routine liquid injection analyses can be performed using the gas chromatograph. After the sample has been purged, the 6-port valve is turned to the desorb position (Figure 4). In this configuration the trap is coupled in series with the gas chromatographic column allowing the carrier gas to backflush the trapped materials into the analytical column. Just as the valve is actuated, the power is turned on to the resistance wire wrapped around the trap. The power is supplied by an electronic temperature controller. Using this device, the trap is rapidly heated to 180° C and then maintained at 180° C with minimal temperature overshoot. The trapped compounds are released as a "plug" to the gas chromatograph. Normally, packed columns with theoretical efficiencies near 500 plates/foot under programmed temperature conditions can accept such desorb injections without altering peak geometry. Substituting a non-controlled power supply, such as a manually-operated variable transformer, will provide nonreproductible retention times and poor quantitative data unless Injection Procedure (8.9.2) is used.

4.1.4 Several Purge and Trap Devices are now commercially available. It is recommended that the following be taken into consideration if a unit is to be purchased:

a. Be sure that the unit is completely compatible with the gas chromatograph to be used for the analysis.

b. Use a 5-ml purging device similar to that shown in Figure 1.

c. Be sure the Tenax portion of the trap meets or exceeds the dimensions shown in Figure 2.

d. With the exception of sample introduction, select a unit that has as many of the purge trap functions automated as possible.

4.2 Gas chromatograph—The chromatograph must be temperature programmable and equipped with a halide specific detector.

4.2.1 Column I is an unusually efficient column which provides outstanding separations for a wide variety of organic compounds. Because of its ability to resolve trihalomethanes from other organochlorine compounds, column I should be used as the primary analytical column (see Table 1 for retention data using this column).

4.2.1.1 Column I parameters: Dimensions—8 feet long x 0.1 inch ID stainless steel or glass tubing. Packing—1% SP-1000 on Carbopack-B (60/80) mesh. Carrier Gas—helium at 40 ml/minute. Temperature program sequence: 45° C isothermal for 3 minutes, program at 8° C/minute to 220° C then hold for 15 minutes or until all compounds have eluted.

NOTE: It has been found that during handling, packing, and programming, active sites are exposed on the Carbopack-B packing. This results in tailing peak geometry and poor resolution of many constituents. To correct this, pack the first 5 cm of the column with 3% SP-1000 on Chromosorb-W 60/80 followed by the Carbopack-B packing. Condition the precolumn and the Carbopack columns with carrier gas flow at 220° C overnight. Pneumatic shocks and rough treatment of packed columns will cause excessive fracturing of the Carbopack. If pressure in excess of 60 psi is required to obtain 40 ml/minute carrier flow, then the column should be repacked.

4.2.1.2 Acceptable column equivalent to Column I: Dimensions—8 feet long x 0.1 inch ID stainless steel or glass tubing. Packing—0.2% Carbowax 1500 on Carbopack-C (80/100) mesh. Carrier Gas—helium at 40 ml/minute. Temperature program sequence—60° C isothermal for 3 minutes, program at 8° C /minute to 160° C, then hold for 2 minutes or until all compounds have eluted.

NOTE: It has been found that during handling, packing, and programming, active sites are exposed on the Carbopack-C packing. This results in poor resolution of constituents and poor peak geometry. To correct this, place a 1 ft. 0.125 in. OD x 0.1 in. ID stainless steel column packed with 3% Carbowax 1500 on Chromosorb-W 60/80 mesh in series before the Carbopack-C column. Condition the precolumn and the Carbopack columns with carrier gas flow at 190° C overnight. The two columns may be retained in series for routine analyses. Trihalomethane retention times are listed in Table 1.

4.2.2 Column II provides unique organohalide-trihalomethane separations when compared to those obtained from Column I (see Figures 5 and 6). However, since the resolution between various compounds is generally not as good as those with Column I, it is recommended that Column II be used as a qualitative confirmatory column for unknown samples when GC/MS confirmation is not possible.

4.2.2.1 Column II parameters: Dimensions—6 feet long x 0.1 inch ID stainless steel or glass. Packing—n-octane on Porisil-C (100/120 mesh). Carrier Gas—helium at 40 cc/minute. Temperature program sequence—50° C isothermal for 3 minutes, program at 6°/minute to 170° C, then hold for 4 minutes or until all compounds have eluted. Trihalomethane retention times are listed in Table 1.

5.8 Organic-free water is defined as water free of interference when employed in the purge and trap analysis.

5.8.1 Organic-free water is generated by passing tap water through a carbon filter bed containing about 1 lb. of activated carbon. Change the activated carbon bed whenever the concentration of any trihalomethane exceeds 0.4 μg/l.

5.8.2 A Millipore Super-Q Water System or its equivalent may be used to generate organic-free water.

5.8.3 Organic-free water may also be prepared by boiling water for 15 minutes. Subsequently, while maintaining the temperature at 90° C, bubble a contaminant-free inert gas through the water for one hour. While still hot, transfer the water to a narrow-mouth screw-cap bottle with a Teflon seal.

5.8.4 Test organic free water each day it is used by analyzing according to Section 8.

5.9 Standards.[*]

5.9.1 Bromoform—96%—available from Aldrich Chemical Company.

5.9.2 Bromodichloromethane 97%—available from Aldrich Chemical Company.

5.9.3 Chlorodibromomethane—available from Columbia Chemical Inc., Columbia, S.C.

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[*] As a precautionary measure, all standards must be checked for purity by boiling point determinations or GC/MS assays (5).

5.9.4 Chloroform—99%—available from Aldrich Chemical Company.

5.10 Standard Stock Solutions

5.10.1 Place about 9.8 ml of methyl alcohol into a ground glass stoppered 10 ml volumetric flask.

5.10.2 Allow the flask to stand unstoppered about 10 minutes or until all alcohol wetted surfaces have dried.

5.10.3 Weigh the flask to the nearest 0.1 mg.

5.10.4 Using a 100 μl syringe, immediately add 2 drops of the reference standard to the flask, then reweigh. *Be sure that the 2 drops fall directly into the alcohol without contacting the neck of the flask.*

5.10.5 Dilute to volume, stopper, then mix by inverting the flask several times.

5.10.6 Transfer the solution to a dated and labeled 15 ml screw cap bottle with a Teflon cap liner.

Note: Because of the toxicity of trihalomethanes, it is necessary to prepare primary dilutions in a hood. It is further recommended that a NIOSH/MESA approved toxic gas respirator be used when the analyst handles high concentrations of such materials.

5.10.7 Calculate the concentration in micrograms per microliter from the net gain in weight.

5.10.8 Store the solution at 4° C.

Note: All standard solutions prepared in methyl alcohol are stable up to 4 weeks when stored under these conditions. They should be discarded after that time has elapsed.

5.11 Aqueous Calibration Standard Precautions.

5.11.1 In order to prepare accurate aqueous standard solutions, the following precautions must be observed.

a. Do not inject more than 20 μl of alcoholic standards into 100 ml of organic-free water.

b. Use of 25 μl Hamilton 702N microsyringe or equivalent. (Variations in needle geometry will adversely affect the ability to deliver reproducible volumes of methanolic standards into water.)

c. Rapidly inject the alcoholic standard into the expanded area of the filled volumetric flask. Remove the needle as fast as possible after injection.

d. Mix aqueous standards by inverting the flask three times only.

e. Discard the contents contained in the neck of the flask. Fill the sample syringe from the standard solution contained in the expanded area of the flask as directed in Section 8.5.

f. Never use pipets to dilute or transfer samples or aqueous standards.

g. Aqueous standards when stored with a headspace are not stable and should be discarded after one hour.

h. Aqueous standards can be stored according to Sections 6.4 and 8.6.

5.11.2 Prepare, from the standard stock solutions, secondary dilution mixtures in methyl alcohol so that a 20 μl injection into 100 ml or organic-free water will generate a calibration standard which produces a response close (±10%) to that of the sample (See 9.1).

5.11.3 Purge and analyze the aqueous calibration standards in the same manner as the samples.

5.11.4 Other calibration procedures (3) which require the delivery of less than 20 μl of a methanolic standard into a 5.0 ml volume of water already contained in the sample syringe are acceptable only if the methanolic standard is delivered by the solvent flush technique (6).

5.12 Quality Check Standard (2.0 μg/l)

5.12.1 From the standard stock solutions, prepare a secondary dilution in methyl alcohol containing 10 ng/μl of each trihalomethane (See Section 5.10.8 Note).

5.12.2 Daily, inject 20.0 μl of this mixture into 100.0 ml of organic-free water ana analyze according to Section 8.

6. *Sample Collection and Handling*

6.1. The sample containers should have a total volume of at least 25 ml.

6.1.1 Narrow mouth screw cap bottles with the TFE fluorocarbon face silicone sepata cap liners are strongly recommended.

6.2 Sample Bottle Preparation

6.2.1 Wash all sample bottles and TFE seals in detergent. Rinse with tap water and finally with distilled water.

6.2.2 Allow the bottles and seals to air dry at room temperature, then place in a 105° C oven for one hour, then allow to cool in a area known to be free of organics.

Note: Do not heat the TFE seals for extended period of time (>1 hour) because the silicone layer slowly degrades at 105° C.

6.2.3 When cool, seal the bottles using the TFE seals that will be used for sealing the samples.

6.3 Sample Stabilization—A chemical reducing agent (Section 5.6) is added to the sample in order to arrest the formation of trihalo-methanes after sample collection (3, 7). *Do not add the reducing agent to samples when data on maximum trihalomethane formation is desired.* If chemical stabilization is employed, the reagent is also added to the blanks. The chemical agent (2.5 to 3 mg/40 ml) is added to the empty sample bottles just prior to shipping to the sampling site.

6.4 Sample Collection

6.4.1 Collect all samples in duplicate.

6.4.2 Fill the sample bottles in such a manner that no air bubbles pass through the sample as the bottle is filled.

6.4.3 Seal the bottles so that no air bubbles are entrapped in it.

6.4.4 Maintain the hermetic seal on the sample bottle until analysis.

6.4.5 Sampling from a water tap.

6.4.5.1 Turn on water and allow the system to flush until the temperature of the water has stabilized. Adjust the flow to about 500 ml/minute and collect duplicate samples from the flowing stream.

6.4.6 Sampling from an open body of water.

6.4.6.1 Fill a 1-quart wide-mouth bottle with sample from a representative area. Carefully fill duplicate sample bottles from the 1-quart bottle as noted in 6.4.2.

6.4.7 If a chemical reducing agent has been added to the sample bottles, fill with sample just to overflowing, seal the bottle, and shake vigorously for 1 minute.

6.4.8 Sealing practice for septum seal screw cap bottles.

6.4.8.1 Open the bottle and fill to overflowing, place on a level surface, position the TFE side of the septum seal upon the convex sample meniscus and seal the bottle by screwing the cap on tightly.

6.4.8.2 Invert the sample and lightly tap the cap on a solid surface. The absence of entrapped air indicates a successful seal. If bubbles are present, open the bottle, add a few additional drops of sample and reseal the bottle as above.

6.4.9 Blanks.

6.4.9.1 Prepare blanks in duplicate at the laboratory by filling and sealing sample bottles with organic-free water just prior to shipping the sample bottles to the sampling site.

6.4.9.2 If the sample is to be stabilized, add an identical amount of stabilization reagent to the blanks.

6.4.9.3 Ship the blanks to and from the sampling site along with the sample bottles.

6.4.9.4 Store the blanks and the samples collected at a given site (sample set) together. A sample set is defined as all the samples collected at a given site (i.e., at a water treatment plant, the duplicate raw source waters, the duplicate finished waters and the duplicate blank samples comprise the sample set).

6.5 When samples have been collected according to Section 6, no measurable loss of trihalomethanes has been detected over extended periods of storage time (3). It is recommended that all samples be analyzed within 14 days of collection.

7. *Conditioning Traps*

7.1 Condition newly packed traps overnight at 180° C with an inert gas flow of at least 20 ml/min.

7.1.1 Vent the trap effluent to the room, not to the analytical column.

7.2 Prior to daily use, condition traps 10 minutes while backflushing at 180° C. It may be beneficial to routinely condition traps overnight while backflushing at 180° C.

7.2.1 The trap may be vented to the analytical column; however, after conditioning, the column must be programmed prior to use.

8. *Extraction and Analysis*

8.1 Adjust the purge gas (nitrogen or helium) flow rate to 40 ml/min.

8.2 Attach the trap inlet to the purging device. Turn the valve to the purge-sorb position (Figure 3).

8.3 Open the syringe valve located on the purging device sample introduction needle.

8.4 Remove the plungers from two 5 ml syringes and attach a closed syringe valve to each.

8.5 Open the sample bottle and carefully pour the sample into one of the syringe barrels until it overflows. Replace the syringe plunger and compress the sample. Open the syringe valve and vent any residual air while adjusting the sample volume to 5.0 ml. Close the valve.

8.6 Fill the second syringe in an identical manner from the same sample bottle. This second syringe is reserved for a duplicate analysis, if necessary (See Sections 9.3 and 9.4).

8.7 Attach the syringe-valve assembly to the syringe valve on the purging device.

8.8 Open the syringe valve and inject the sample into the purging chamber. Close both valves. Purge the sample for 11.0±.05 minutes.

8.9 After the 11-minute purge time, attach the trap to the chromatograph (turn the valve to the desorb position) and introduce the trapped materials to the GC column by rapidly heating the trap to 180°C while backflushing the trap with an inert gas between 20 and 60 ml/min for 4 minutes.

8.9.1 If the trap can be rapidly heated to 180°C and maintained at this temperature, the GC analysis can begin as the sample is desorbed, i.e., the column is at the initial 45°C operating temperature. The equipment described in Figure 4 will perform accordingly.

8.9.2 With other types of equipment (see Section 4.1.4 and Reference 1) where the trap is not rapidly heated or is not heated in a reproducible manner, it may be necessary to transfer the contents of the trap into the analytical column at <30°C where it is once again trapped. Once the transfer is complete (4 minutes), the column is rapidly heated to the initial operating temperature for analysis.

8.9.3 If injection procedure 8.9.1 is used and the early eluting peaks in the resulting chromatogram have poor geometry or variable retention times, then Section 8.9.2 should be used.

8.10 After the extracted sample is introduced into the gas chromatograph, empty the gas purging device using the sample introduction syringe, followed by two 5-ml flushes of organic-free water. When the purging device is emptied, leave the syringe valve open allowing the purge gas to vent through the sample introduction needle.

8.11 Analyze each sample and sample blank from the sample set in an identical manner (see Section 6.4.9.4) on the same day.

8.12 Prepare calibration standards from the standard stock solutions (Section 5.10) in organic-free water that are close to the unknown in trihalomethane composition and concentration (Section 9.1). The concentrations should be such that only 20 μl or less of the secondary dilution need be added to 100 ml of organic-free water to produce a standard at the same level as the unknown.

8.13 As an alternative to Section 8.12, prepare a calibration curve for each trihalomethane containing at least 3 points, two of which must bracket the unknown.

9. *Analytical Quality Control*

9.1 Analyze the 2 μg/l check sample daily before any samples are analyzed. Instrument status checks and lower limit of detection estimations based upon response factor calculations at five times the noise level are obtained from these data. In addition, response factor data obtained from the 2 μg/l check standard can be used to estimate the concentration of the unknowns. From this information, the appropriate standard dilutions can be determined.

9.2 Analyze the sample blank to monitor for potential interferences as described in Sections 3.1, 3.2, and 3.4.

9.3 Spiked Samples

9.3.1 For laboratories analyzing more than 10 samples a day, each 10th sample should be a laboratory generated spike which closely duplicates the average finished drinking water in trihalomethane composition and concentration. Prepare the spiked sample in organic-free water as described in Section 5.11.

9.3.2 For laboratories analyzing less than 10 samples daily, each time the analysis is performed, analyze at least 1 laboratory generated spike sample which closely duplicates the average finished drinking water in trihalomethane composition and concentration. Prepare the spiked sample in organic-free water as described in Section 5.11.

9.4 Randomly select and analyze 10% of all samples in duplicate.

9.4.1 Analyze all samples in duplicate which appear to deviate more than 30% from any established norm.

9.5 Maintain an up-to-date log on the accuracy and precision data collected in Sections 9.3 and 9.4. If results are significantly different than those cited in Section 11.1, the analyst should check out the entire analyses scheme to determine why the laboratory's precision and accuracy limits are greater.

9.6 Quarterly, spike an EMSL-Cincinnati trihalomethane quality control sample into organic-free water and analyze.

9.6.1 The results of the EMSL trihalomethane quality control sample should agree within 20% of the true value for each trihalomethane. If they do not then the analyst must check each step in the standard generation procedure to solve the problem (Sections 5.9, 5.10, and 5.11).

9.7 Maintain a record of the retention times for each trihalomethane using data gathered from spiked samples and standards.

9.7.1 Daily calculate the average retention time for each trihalomethane and the variance encountered for the analyses.

9.7.2 If individual trihalomethane retention time varies by more than 10% over an eight hour period or does not fall with 10% of an established norm, the system is "out of control." The source of retention data variation must be corrected before acceptable data can be generated.

10. *Calculations*

10.1 Locate each trihalomethane in the sample chromatogram by comparing the retention time of the suspect peak to the data gathered in 9.7.1. The retention time of the suspect peak must fall within the limits established in 9.7.1 for single column identification.

10.2 Calculate the concentration of the samples by comparing the peak height or peak areas of the samples to the standard peak height (8.12). Round off the data to the nearest μg/l or two significant figures.

$$\mu g/l = \frac{\text{peak height sample}}{\text{peak height standard}} \times (\text{conc. std. } \mu g/l$$

10.3 Report the results obtained from the lower limit of detection estimates along with the data for the samples.

10.4 Calculate the total trihalomethane concentration (TTHM) by summing the 4 individual trihalomethane concentrations in μg/l. TTHM (μg/l)=(Conc. $CHCl_3$)+(Conc. $CHBrCl_2$)+(Conc. $CHBr_2Cl$)+(Conc. $CHBr$).

10.5 Calculate the limit of detection (LOD) for each trihalomethane not detected using the following criteria:

$$\text{LOD } (\mu g/l) = \frac{A \times ATT}{B \times ATT} \quad (2\ \mu g/l)$$

where

B=peak height (mm) of 2 µg/l quality check standard

A=5 times the noise level in (mm) at the exact retention time of the trihalomethane or the baseline displacement in (mm) from the theoretical zero at the exact retention time of the trihalomethane.

ATT=Attenuation factor

11. *Accuracy and Precision*

11.1 One liter of organic-free water was spiked with the trihalomethanes and used to fill septum seal vials which were stored under ambient conditions. The spiked samples were randomly analyzed over a 2-week period of time. The single laboratory data listed in Table II reflect the errors due to the analytical procedure and storage.

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TABLE I—RETENTION DATA FOR TRIHALOMETHANES

Trihalomethane	Retention time minutes		
	Column I 1% sp1000 Carbopack B	Acceptable Alternative to column I 0.4% Carbowax Carbopack	Column II n-octane Porasil-C
Chloroform	10.7	8.2	12.2
Bromodichloromethane	13.7	10.8	14.7
Chlorodibromomethane (Dibromochloromethane)	16.5	13.2	16.6
Bromoform	19.2	15.7	19.2

TABLE II—SINGLE LABORATORY ACCURACY AND PRECISION FOR TRIHALOMETHANES

Spike µg/l	Number samples	Mean µg/l	Precision standard deviation	Accuracy percent recovery
Chloroform				
1.2	12	1.2	0.14	100
12.0	8	11	0.16	92
119.0	11	105	7.9	88
Bromodichloromethane				
1.6	12	1.5	0.05	94
16.0	8	15	0.39	94
160.0	11	145	10.2	91
Chlorodibromomethane				
2.0	12	1.9	0.09	95
20.0	8	19	0.70	95
196.0	11	185	10.6	94
Bromoform				
2.3	12	2.3	0.16	100
23.0	8	23	1.38	100
231.0	11	223	16.3	97

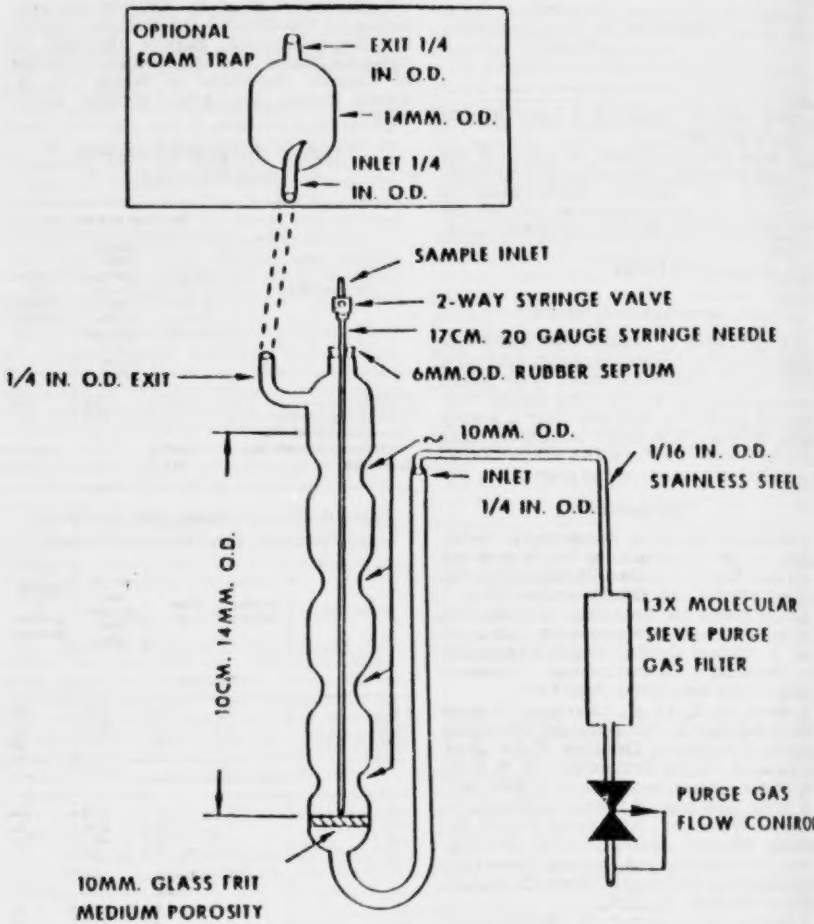

OPTIONAL
FOAM TRAP
EXIT 1/4
IN. O.D.
14MM. O.D.
INLET 1/4
IN. O.D.
SAMPLE INLET
2-WAY SYRINGE VALVE
17CM. 20 GAUGE SYRINGE NEEDLE
6MM.O.D. RUBBER SEPTUM
1/4 IN. O.D. EXIT
10MM. O.D.
INLET
1/4 IN. O.D.
1/16 IN. O.D.
STAINLESS STEEL
10CM. 14MM. O.D.
13X MOLECULAR
SIEVE PURGE
GAS FILTER
PURGE GAS
FLOW CONTRO
10MM. GLASS FRIT
MEDIUM POROSITY

FIGURE 1. PURGING DEVICE

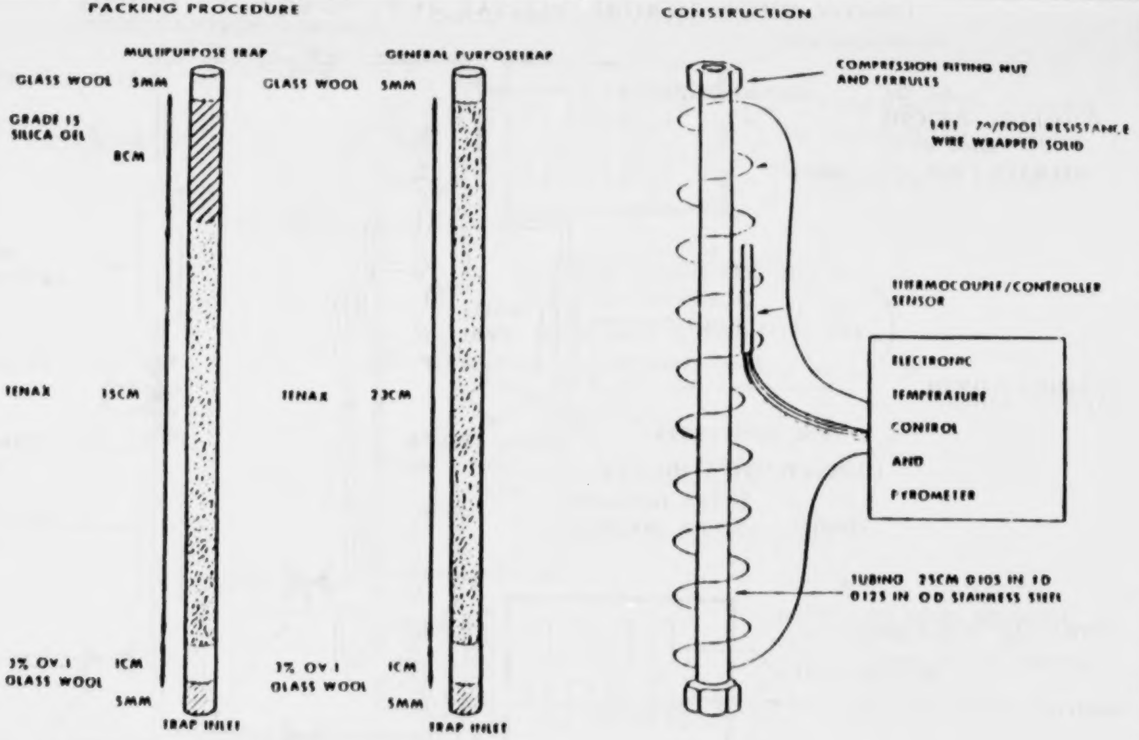
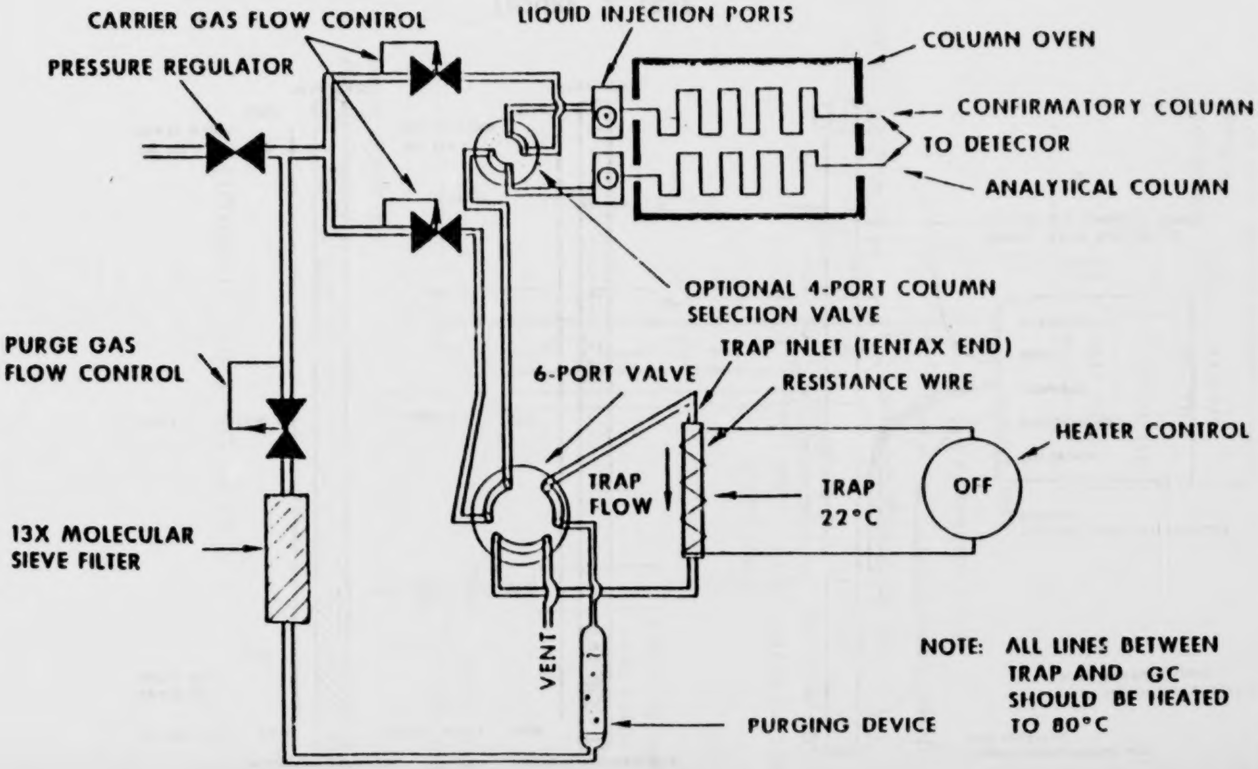

PACKING PROCEDURE
MULTIPURPOSE TRAP
GLASS WOOL 5MM
GRADE 15 SILICA GEL 8CM
TENAX 15CM
3% OV 1 GLASS WOOL 1CM
5MM
TRAP INLET
GENERAL PURPOSE TRAP
GLASS WOOL 5MM
TENAX 23CM
3% OV 1 GLASS WOOL 1CM
5MM
TRAP INLET
CONSTRUCTION
COMPRESSION FITTING NUT AND FERRULES
14FT 7Ω/FOOT RESISTANCE WIRE WRAPPED SOLID
THERMOCOUPLE/CONTROLLER SENSOR
ELECTRONIC TEMPERATURE CONTROL AND PYROMETER
TUBING 25CM 0105 IN ID 0125 IN OD STAINLESS STEEL

FIGURE 2 TRAP


CARRIER GAS FLOW CONTROL
PRESSURE REGULATOR
LIQUID INJECTION PORTS
COLUMN OVEN
CONFIRMATORY COLUMN
TO DETECTOR
ANALYTICAL COLUMN
OPTIONAL 4-PORT COLUMN SELECTION VALVE
PURGE GAS FLOW CONTROL
TRAP INLET (TENTAX END)
6-PORT VALVE
RESISTANCE WIRE
HEATER CONTROL
TRAP FLOW
TRAP 22°C
OFF
13X MOLECULAR SIEVE FILTER
VENT
PURGING DEVICE

NOTE: ALL LINES BETWEEN TRAP AND GC SHOULD BE HEATED TO 80°C

FIGURE 3 PURGE-TRAP SYSTEM (PURGE-SORB MODE)

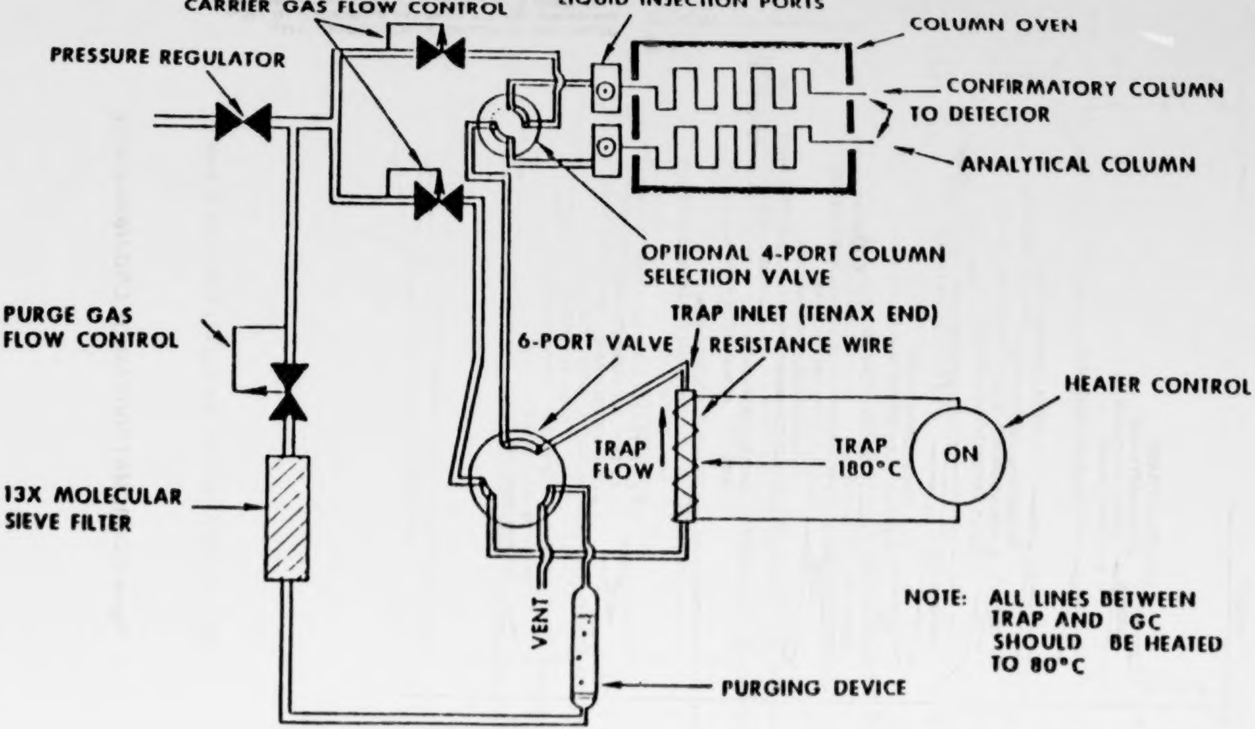

CARRIER GAS FLOW CONTROL
LIQUID INJECTION PORTS
COLUMN OVEN
CONFIRMATORY COLUMN
TO DETECTOR
ANALYTICAL COLUMN
PRESSURE REGULATOR
OPTIONAL 4-PORT COLUMN SELECTION VALVE
PURGE GAS FLOW CONTROL
TRAP INLET (TENAX END)
6-PORT VALVE
RESISTANCE WIRE
HEATER CONTROL
TRAP FLOW
TRAP 180°C
ON
13X MOLECULAR SIEVE FILTER
VENT
NOTE: ALL LINES BETWEEN TRAP AND GC SHOULD BE HEATED TO 80°C
PURGING DEVICE

FIGURE 4 PURGE-TRAP SYSTEM (DESORB MODE)

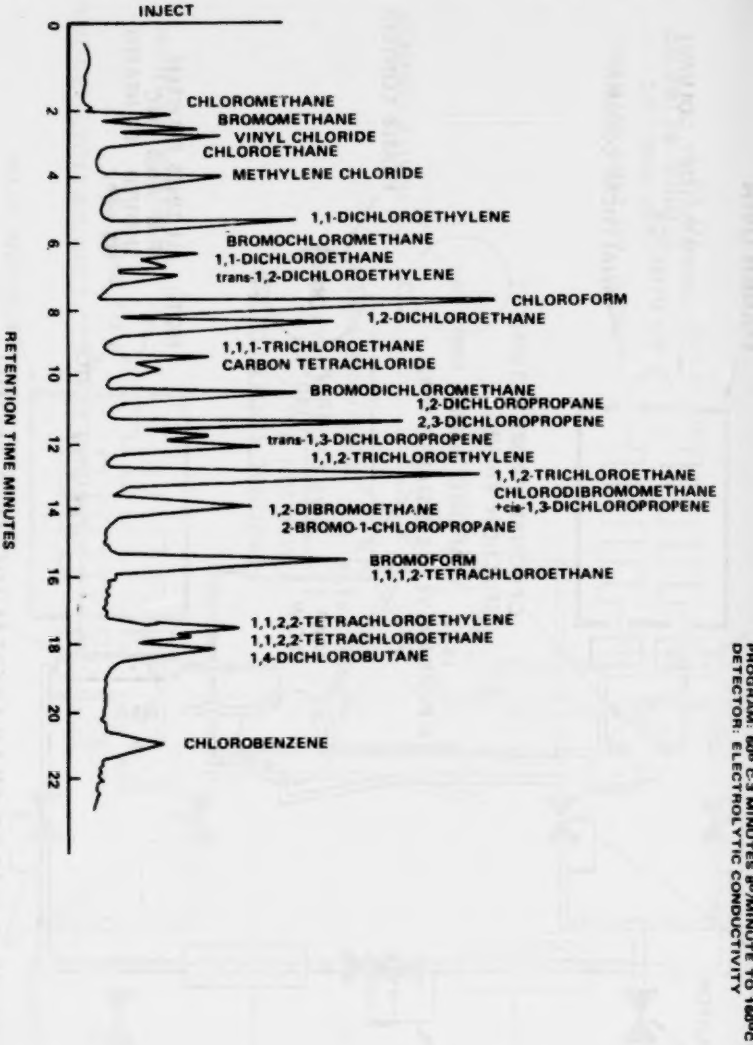


Figure 5 CHROMATROGRAM OF ORGANOHALIDES

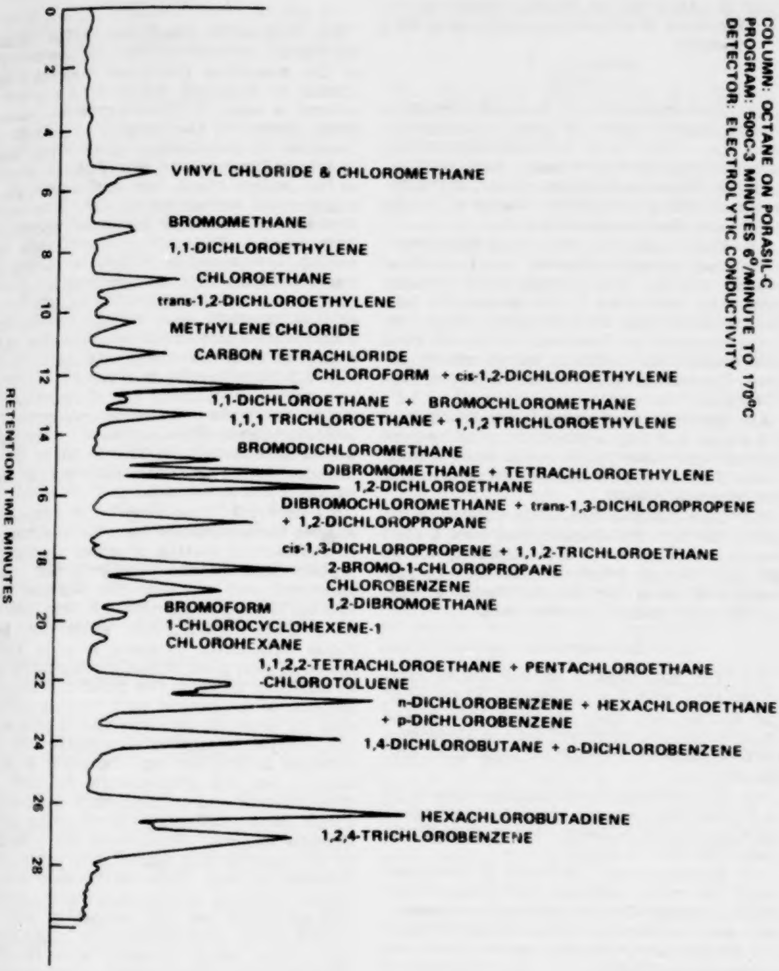


Figure 6 CHROMATROGRAM OF ORGANOHALIDES

PART II—ANALYSIS OF TRIHALOMETHANES IN DRINKING WATER BY LIQUID/LIQUID EXTRACTION

1. *Scope.*

1.1 This method (1,2) is applicable only to the determination of four trihalomethanes, i.e., chloroform, bromodichloromethane, chlorodibromomethane, and bromoform in finished drinking water, drinking water during intermediate stages of treatment, and the raw source water.

1.2 For compounds other than the above-mentioned trihalomethanes, or for other sample sources, the analyst must demonstrate the usefulness of the method by collecting precision and accuracy data on actual samples as described in (3) and provide qualitative confirmation of results by Gas Chromatography/Mass Spectrometry (GC/MS) (4).

1.3 Qualitative analyses using GC/MS or the purge and trap method (5) must be performed to characterize each raw source water if peaks appear as interferences in the raw source analysis.

1.4 The method has been shown to be useful for the trihalomethanes over a concentration range from approximately 0.5 to 200 μg/l. Actual detection limits are highly dependent upon the characteristics of the gas chromatographic system used.

2. *Summary*

2.1 Ten milliliters of sample are extracted one time with 2 ml of solvent. Three μl of the extract are then injected into a gas chromatograph equipped with a linearized electron capture detector for separation and analysis.

2.2 The extraction and analysis time is 10 to 50 minutes per sample depending upon the analytical conditions chosen. (See Table 1 and Figures 1, 2, and 3.)

2.3 Confirmatory evidence is obtained using dissimilar columns and temperature programming. When component concentrations are sufficiently high (>50 μg/l), halogen specific detectors may be employed for improved specificity.

2.4 Unequivocal confirmatory analyses at high levels (>50 μg/l) can be performed using GC/MS in place of the electron capture detector. At levels below 50 μg/l, unequivocal confirmation can only be performed by the purge and trap technique using GC/MS (4, 5).

2.5 Standards dosed into organic free water and the samples are extracted and analyzed in an identical manner in order to compensate for possible extraction losses.

2.6 The concentration of each trihalomethane is summed and reported as total trihalomethanes in μg/l.

3. *Interferences*

3.1 Impurities contained in the extracting solvent usually account for the majority of the analytical problems. Solvent blanks should be analyzed before a new bottle of solvent is used to extract samples. Indirect daily checks on the extracting solvent are obtained by monitoring the sample blanks (6.4.10). Whenever an interference is noted in the sample blank, the analyst should reanalyze the extracting solvent. The extraction solvent should be discarded whenever a high level (>10 μg/l) of interfering compounds are traced to it. Low level interferences generally can be removed by distillation or column chromatography (6); however, it is generally more economical to obtain a new source of solvent or select one of the approved alternative solvents listed in Section 5.1. Interference free solvent is defined as a solvent containing less than 0.4 μg/l individual trihalomethane interference. Protect interference-free solvents by storing in a non-laboratory area known to be free of organochlorine solvents. *Subtracting blank values is not recommended.*

3.2 Several instances of accidental sample contamination have been attributed to diffusion of volatile organics through the septum seal on the sample bottle during shipment and storage. The sample blank (6.4.10) is used to monitor for this problem.

3.3 This liquid/liquid extraction technique efficiently extracts a wide boiling range of non-polar organic compounds and, in addition, extracts the polar organic components of the sample with varying efficiencies. In order to perform the trihalomethane analysis as rapidly as possible with sensitivities in the low μg/l range, it is necessary to use the semi-specific electron capture detector and chromatographic columns which have relatively poor resolving power. Because of these concessions, the probability of experiencing chromatographic interferences is high. Trihalomethanes are primarily products of the chlorination process and generally do not appear in the raw source water. The absence of peaks in the raw source water analysis with retention times similar to the trihalomethanes is generally adequate evidence of an interference-free finished drinking water analysis. Because of these possible interferences, in addition to each finished drinking water analysis, a representative raw source water (6.4.5) must be analyzed. When potential interferences are noted in the raw source water analysis, the alternate chromatographic columns must be used to reanalyze the sample set. If interferences are still noted, qualitative identifications should be performed according to Sections 2.3 and 2.4. If the peaks are confirmed to be other than trihalomethanes and add significantly to the total trihalomethane value in the finished drinking water analysis, then the sample set must be analyzed by the purge and trap method (5).

4. *Apparatus*

4.1 Extraction vessel—A 15 ml total volume glass vessel with a Teflon lined screw-cap is required to efficiently extract the samples.

4.1.1 For samples that do not form emulsions 10 ml screw-cap flasks with a Teflon faced septum (total volume is ml) are recommended. Flasks and caps—Pierce—#13310 or equivalent. Septa—Teflon silicone—Pierce #12718 or equivalent.

4.1.2 For samples that form emulsions (turbid source water) 15 ml screw cap centrifuge tubes with a Teflon cap liner are recommended. Centrifuge tube—Corning 8062-15 or equivalent.

4.2 Sampling containers—40 ml screw cap sealed with Teflon faced silicone septa. Vials and caps—Pierce #13075 or equivalent. Septa—Pierce #12722 or equivalent.

4.3 Micro syringes—10, 100 μl.

4.4 Micro syringe—25 μl with a 2-inch by 0.006-inch needle—Hamilton 702N or equivalent.

4.5 Syringes—10 ml glass hypodermic with luerlok tip (2 each).

4.6 Syringe valve—2-way with luer ends (2 each)—Hamilton #86570—1FM1 or equivalent.

4.7 Pipette—2.0 ml transfer.

4.8 Glass stoppered volumetric flasks—10 and 100 ml.

4.9 Gas chromatograph with linearized electron capture detector. (Recommended option—temperature programmable. See Section 4.12.)

4.10 Column A—4 mm ID x 2m long glass packed with 3% SP-1000 on Supelcoport (100/120 mesh) operated at 50°C with 60 ml/min flow. (See Figure 1 for a sample chromatogram and Table 1 for retention data.)

4.11 Column B—2 mm ID x 2m long glass packed with 10% squalane on Chromosorb WAW (80/100 mesh) operated at 67°C with 25 ml/min flow. This column is recommended as the primary analytical column. Trichloroethylene, a common raw source water contaminate, coelutes with bromodichloromethane. (See Figure 2 for a sample chromatogram and Table 1 for retention data.)

4.12 Column C—2 mm ID x 3m long glass packed with 6% OV-11/4% SP-2100 on Supelcoport (100/120 mesh) temperature program 45°C for 12 minutes, then program at 1°/minute to 70°C with a 25 ml/min flow. (See Figure 3 for a sample chromatogram and Table I for retention data.)

4.13 Standard storage containers—15 ml amber screw-cap septum bottles with Teflon faced silicone septa. Bottles and caps—Pierce #19830 or equivalent. Septa—Pierce #12716 or equivalent.

5. *Reagents*

5.1 Extraction solvent—(See 3.1). Recommended—Pentane[a]. Alternative—hexane, methylcyclohexane or 2,2,4-trimethylpentane.

5.2 Methyl alcohol—ACS Reagent Grade.

5.3 Free and combined chlorine reducing agents—Sodium thiosulfate ACS Reagent Grade—sodium sulfite ACS Reagent Grade.

5.4 Activated carbon—Filtrasorb—200, available from Calgon Corporation, Pittsburgh, PA, or equivalent.

5.5 Standards.[b]

5.5.1 Bromoform 96%—available from Aldrich Chemical Company.

5.5.2 Bromodichloromethane 97%—available from Aldrich Chemical Company.

5.5.3 Chlorodibromomethane—available from Columbia Chemical, Incorporated, Columbia, S.C.

5.5.4 Chloroform 99%—available from Aldrich Chemical Company.

5.6 Organic-free water—Organic-free water is defined as water free of interference when employed in the procedure described herein.

5.6.1 Organic-free water is generated by passing tap water through a carbon filter bed containing carbon. Change the activated carbon whenever the concentration of any trihalomethane exceeds 0.4 μg/l.

5.6.2 A Millipore Super-Q Water System or its equivalent may be used to generate organic-free deionized water.

5.6.3 Organic-free water may also be prepared by boiling water for 15 minutes. Subsequently, while maintaining the temperature at 90° C, bubble a contaminant free inert gas through the water at 100 ml/minute for one hour. While still hot, transfer the water to a narrow mouth screw cap bottle with a Teflon seal.

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[a] Pentane has been selected as the best solvent for this analysis because it elutes, on all of the columns, well before any of the trihalomethanes. High altitudes or laboratory temperatures in excess of 75°F may make the use of this solvent impractical. For these reasons, alternative solvents are acceptable; however, the analyst may experience baseline variances in the elution areas of the trihalomethanes due to coelution of these solvents. The degree of difficulty appears to be dependent upon the design and condition of the electron capture detector. Such problems should be insignificant when concentrations of the coeluting trihalomethane are in excess of 5 μg/l.

[b] As a precautionary measure, all standards must be checked for purity by boiling point determinations or GC/MS assays.

5.6.4 Test organic free water each day it is used by analyzing it according to Section 7.

5.7 Standard stock solutions.

5.7.1 Fill a 10.0 ml ground glass stoppered volumetric flask with approximately 9.8 ml of methyl alcohol.

5.7.2 Allow the flask to stand unstoppered about 10 minutes or until all alcohol wetted surfaces dry.

5.7.3 Weigh the unstoppered flask to the nearest 0.1 mg.

5.7.4 Using a 100 µl syringe, immediately add 2 to 3 drops of the reference standard to the flask, then reweigh. *Be sure that the reference standard falls directly into the alcohol without contacting the neck of the flask.*

5.7.5 Dilute to volume, stopper, then mix by inverting the flask several times.

5.7.6 Transfer the standard solution to a dated and labeled 15 ml screw-cap bottle with a Teflon cap liner.

NOTE: Because of the toxicity of trihalomethanes, it is necessary to prepare primary dilutions in a hood. It is further recommended that a NIOSH/MESA-approved toxic gas respirator be used when the analyst handles high concentrations of such materials.

5.7.7 Calculate the concentration in micrograms per microliter from the net gain in weight.

5.7.8 Store the solution at 4° C.

NOTE: All standard solutions prepared in methyl alcohol are stable up to 4 weeks when stored under these conditions. They should be discarded after that time has elapsed.

5.8 Aqueous calibration standard precautions.

5.8.1 In order to prepare accurate aqueous standard solutions, the following precautions must be observed:

a. Do not inject more than 20 µl of alcoholic standards into 100 ml of organic-free water.

b. Use a 25 µl Hamilton 702N microsyringe or equivalent. (Variations in needle geometry will adversely affect the ability to deliver reproducible volumes of methanolic standards into water.)

c. Rapidly inject the aloholic standard into the expanded area of the filled volumetric flask. Remove the needle as fast as possible after injection.

d. Mix aqueous standards by inverting the flask three times only.

e. Discard the contents contained in the neck of the flask. Fill the sample syringe from the standard solution contained in the expanded area of the flask as directed in Section 7.

f. Never use pipets to dilute or transfer samples and aqueous standards.

g. Aqueous standards, when stored with a headspace, are not stable and should be discarded after one hour. Aqueous standards can be stored according to Sections 6.4.9 and 7.2.

5.9 Calibration standards.

5.9.1 Prepare, from the standard stock solutions, a multicomponent secondary dilution mixture in methyl alcohol so that a 20 µl injection into 100 ml of organic-free water will generate a calibration standard which produces a response close (± 25%) to that of the unknown. (See 8.1.)

5.9.2 Alternative calibration procedure.

5.9.2.1 Construct a calibration curve for each trihalomethane containing a minimum of 3 different concentrations. Two of the concentrations must bracket each unknown.

5.9.3 Extract and analyze the aqueous calibration standards in the same manner as the unknowns.

5.9.4 Other calibration procedures (7) which require the delivery of less than 20 µl of methanolic standards to 10.0 ml volume of water contained in the sample syringe are acceptable only if the methanolic standard is delivered by the solvent flush technique (8).

5.10 Quality Check Standard Mixture.

5.10.1 Prepare, from the standard stock solutions, a secondary dilution mixture in methyl alcohol that contains 10.0 ng/µl of each compound. (See 5.7.6 and 5.7.8.)

5.10.2 Daily, prepare and analyze a 2 µg/l aqueous dilution from this mixture by dosing 20.0 µl into 100 ml of organic-free water (See Section 8.1).

6. Sample Collection and Handling.

6.1 The sample containers should have a total volume of at least 25 ml.

6.1.1 Narrow-mouth screw-cap bottles with the TFE fluorocarbon faced silicone septa cap liners are strongly recommended.

6.2 Glassware Preparation.

6.2.1 Wash all sample bottles, TFE seals and extraction flasks in detergent. Rinse with tap water and finally with distilled water.

6.2.2 Allow the bottles and seals to air dry, then place in an 105° C oven for 1 hour, then allow to cool in an area known to be free of organics.

NOTE: Do not heat the TFE seals for extended periods of time (>1 hour) because the silicone layer slowly degrades at 105° C.

6.2.3 When cool, seal the bottles using the TFE seals that will be used for sealing the samples.

6.3 Sample stabilization—A chemical reducing agent (Section 5.3) is added to the samples in order to arrest the formation of additional trihalomethanes after sample collection (7,9) and to eliminate the possibility of free chlorine reacting with impuri the extraction solvent to form interfering rganohalides. *DO NOT ADD THE REDUC- NG AGENT TO SAMPLES AT COLLEC- ION TIME WHEN DATA FOR MAXIMUM RIHALOMETHANE FORMATION IS DE- IRED.* If chemical stabilization is em- loyed, then the reagent is also added to the lanks. The chemical agent (2.5 to 3 mg/40 l) is added in crystalline form to the mpty sample bottle just prior to shipping the sampling site. If chemical stabiliza- on is not employed at sampling time then e reducing agent is added just before ex- raction.

6.4 Sample Collection.

6.4.1 Collect all samples in duplicate.

6.4.2 Fill the sample bottles in such a anner that no air bubbles pass through e sample as the bottle is filled.

6.4.3 Seal the bottle so that no air bub- les are entrapped in it.

6.4.4 Maintain the hermetic seal on the mple bottle until analysis.

6.4.5 The raw source water sample histo- y should resemble the finished drinking ater. The average retention time of the nished drinking water within the water lant should be taken into account when mpling the raw source water.

6.4.6 Sampling from a water tap.

6.4.6.1 Turn on the water and allow the ystem to flush until the temperature of the ater has stabilized. Adjust the flow to bout 500 ml/minute and collect duplicate mples from the flowing stream.

6.4.7 Sampling from an open body of ater.

6.4.7.1 Fill a 1-quart wide-mouth bottle ith sample from a representative area. arefully fill duplicate sample bottles from e 1-quart bottle as in 6.4.

6.4.8 If a chemical reducing agent has een added to the sample bottles, fill with mple just to overflowing, seal the bottle, d shake vigorously for 1 minute.

6.4.9 Sealing practice for septum seal rew cap bottles.

6.4.9.1 Open the bottle and fill to over- owing. Place on a level surface. Position e TFE side of the septum seal upon the nvex sample meniscus and seal the bottle screwing the cap on tightly.

6.4.9.2 Invert the sample and lightly tap e cap on a solid surface. The absence of trapped air indicates a successful seal. If bbles are present, open the bottle, add a w additional drops of sample, then reseal ttle as above.

6.4.10 Sample blanks.

6.4.10.1 Prepare blanks in duplicate at e laboratory by filling and sealing sample ttles with organic-free water just prior to ipping the sample bottles to the sampling te.

6.4.10.2 If the sample is to be stabilized, d an identical amount of reducing agent the blanks.

6.4.10.3 Ship the blanks to and from the sampling site along with the sample bottles.

6.4.10.4 Store the blanks and the samples, collected at a given site (sample set), together in a protected area known to be free from contamination. A sample set is defined as all the samples collected at a given site (i.e., at a water treatment plant, duplicate raw source water, duplicate finished water and the duplicate sample blanks comprise the sample set).

6.5 When samples are collected and stored under these conditions, no measurable loss of trihalomethanes has been detected over extended periods of time (7). It is recommended that the samples be analyzed within 14 days of collection.

7. *Extraction and Analysis.*

7.1 Remove the plungers from two 10-ml syringes and attach a closed syringe valve to each.

7.2 Open the sample bottle[c] (or standard) and carefully pour the sample into one of the syringe barrels until it overflows. Replace the plunger and compress the sample. Open the syringe valve and vent any residue air while adjusting the sample volume to 10.0 ml. Close the valve.

7.3 Fill the second syringe in an identical manner from the same sample bottle. This syringe is reserved for a replicate analysis (see 8.3 and 8.4).

7.4 Pipette 2.0 ml of extraction solvent into a clean extraction flask.

7.5 Carefully inject the contents of the syringe into the extraction flask.

7.6 Seal with a Teflon faced septum.

7.7 Shake vigorously for 1 minute.

7.8 Let stand until the phases separate (∫60 seconds).

7.8.1 If the phases do not separate on standing then centrifugation can be used to facilitate separation.

7.9 Analyze the sample by injecting 3.0 μl (solvent flush technique, (8)) of the upper (organic) phase into the gas chromatograph.

8. *Analytical Quality Control.*

8.1 A 2 μg/l quality check standard (See 5.10) should be extracted and analyzed each day before any samples are analyzed. Instrument status checks and lower limit of detection estimations based upon response factor calculations at 5 times the noise level are obtained from these data. In addition, the data obtained from the quality check standard can be used to estimate the concentration of the unknowns. From this information the appropriate standards can be determined.

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[c] If for any reason the chemical reducing agent has not been added to the sample, then it must be added just prior to analyses at the rate of 2.5 to 3 mg/40 ml or by adding 1 mg directly to the sample in the extraction flask.

8.2 Analyze the sample blank and the raw source water to monitor for potential interferences as described in Sections 3.1, 3.2, and 3.3.

8.3 Spiked samples.

8.3.1 For those laboratories analyzing more than 10 samples a day, each 10th sample analyzed should be a laboratory-generated spike which closely duplicates the average finished drinking water in trihalomethane composition and concentration. Prepare the spiked sample in organic-free water as described in Section 5.9.

8.3.2 In those laboratories analyzing less than 10 samples daily, each time the analysis is performed, analyze at least one laboratory generated spike sample which closely duplicates the average finished drinking water in trihalomethane composition and concentration. Prepare the spiked sample in organic-free water as described in section 5.9.

8.3.3 Maintain an up-to-date log on the accuracy and precision data collected in Sections 8.3 and 8.4. If results are significantly different than those cited in Section 10.1, the analyst should check out the entire analysis scheme to determine why the laboratory's precision and accuracy limits are greater.

8.4 Randomly select and analyze 10% of all samples in duplicate.

8.5 Analyze all samples in duplicate which appear to deviate more than 30% from any established norm.

8.6 Quarterly, spike an EMSL-Cincinnati trihalomethane quality control sample into organic-free water and analyze.

8.6.1 The results of the EMSL trihalomethane quality control sample should agree within 20% of the true value for each trihalomethane. If they do not, the analyst must check each step in the standard generation procedure to solve the problem.

8.7 It is important that the analyst be aware of the linear response characteristics of the electron capture system that is utilized. Calibration curves should be generated and rechecked quarterly for each trihalomethane over the concentration range encountered in the samples in order to confirm the linear response range of the system. Quantitative data cannot be calculated from non-linear responses. Whenever non-linear responses are noted, the analyst must dilute the sample for reanalysis.

8.8 Maintain a record of the retention times for each trihalomethane using data gathered from spiked samples and standards.

8.8.1 Daily calculate the average retention time for each trihalomethane and the variance encountered for the analyses.

8.8.2 If individual trihalomethane retention time varies by more than 10% over an eight hour period or does not fall within 10% of an established norm, the system is "out of control." The source of retention data variation must be corrected before acceptable data can be generated.

9. Calculations.

9.1 Locate each trihalomethane in the sample chromatogram by comparing the retention time of the suspect peak to the data gathered in 8.8.1. The retention time of the suspect peak must fall within the limits established in 8.8.1 for a single column identification.

9.2 Calculate the concentration of each trihalomethane by comparing the peak heights or peak areas of the samples to those of the standards. Round off the data to the nearest μg/l or two significant figures.

Concentration, μg/l = sample peak height/standard peak height × standard concentration, μg/l.

9.3 Calculate the total trihalomethane concentration (TTHM) by summing the 4 individual trihalomethane concentrations in μg/l: TTHM (μg/l) = (conc. $CHCl_3$)+(conc. $CHBrCl_2$)+(conc. $CHBr_2Cl$)+(conc. $CHBr_3$)

9.4 Calculate the limit of detection (LOD) for each trihalomethane not detected using the following criteria:

$$\text{LOD } (\mu g/l) = \frac{(\text{AXATT})}{(\text{BXATT}) \times (2\ \mu g/l)}$$

Where:

B = peak height (mm) of 2 μg/l quality check standard

A = 5 times the noise level in mm at the exact retention time of the trihalomethane or the base line displacement in mm from theoretical zero at the exact retention time for the trihalomethane.

ATT = attenuation factor.

9.5 Report the results obtained from the lower limit of detection estimates along with the data for the samples.

10. Precision and Accuracy

10.1 Single lab precision and accuracy. The data in Table II were generated by spiking organic-free water with trihalomethanes as described in 5.9. The mixtures were analyzed by the analyst as true unknowns.

TABLE 1—RETENTION TIMES FOR TRIHALOMETHANES

Trihalomethane	Retention time minutes		
	Column A	Column B	Column C
Chloroform	1.0	1.3	4.9
Bromodichloromethane	1.5	[a]2.5	11.0
Chlorodibromomethane	2.6	5.6	23.1
(Dibromochiuromethane) bromoform	5.5	10.9	39.4

[a] On this column, trichloroethylene, a common raw source water contaminate, coelutes with bromodichloromethane.

TABLE II—SINGLE LABORATORY ACCURACY AND PRECISION

Compound	Dose level µg/l	Number of samples	Mean µg/l	Precision relative standard deviation, percent	Accuracy percent recovery
$CHCl_3$	9.1	5	10	11	110
$CHCl_3$	69	3	73	5.3	106
$CHBrCl_2$	1.2	5	1.3	9.8	108
$CHBrCl_2$	12	2	15	1.4	125
$CHBr_2Cl$	2.7	5	2.0	17	74
$CHBr_2Cl$	17	3	16	9.9	94
$CHBr_3$	2.9	5	2.2	10	76
$CHBr_3$	14	3	16	12	114

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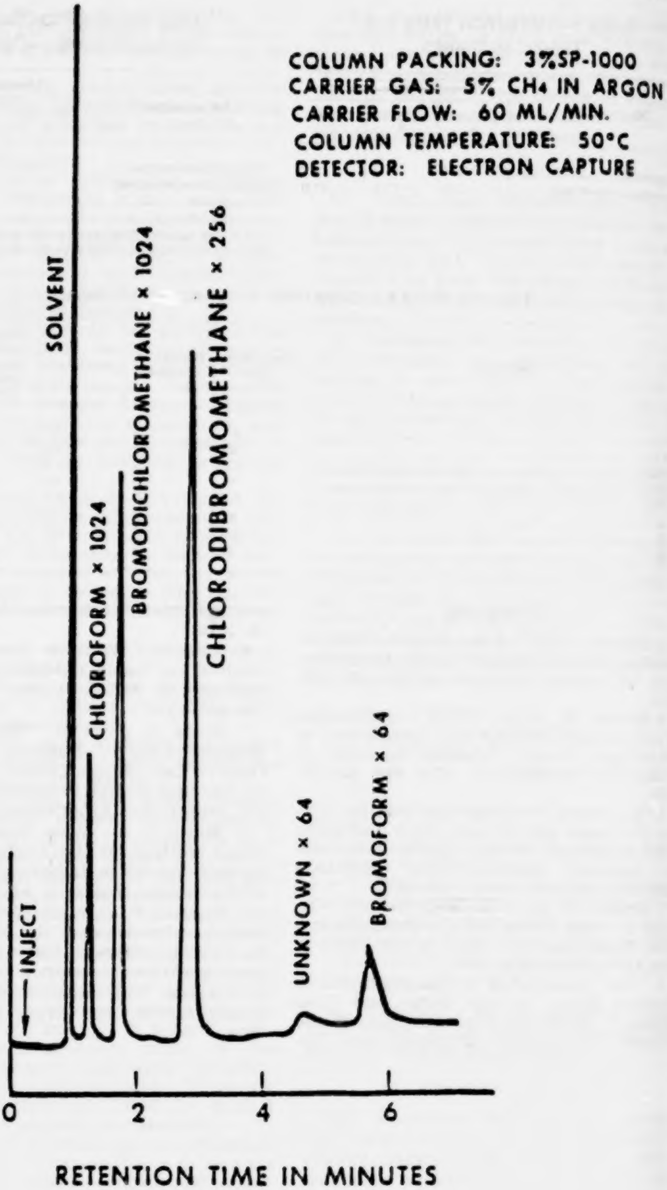

FIGURE 1. FINISHED WATER EXTRACT

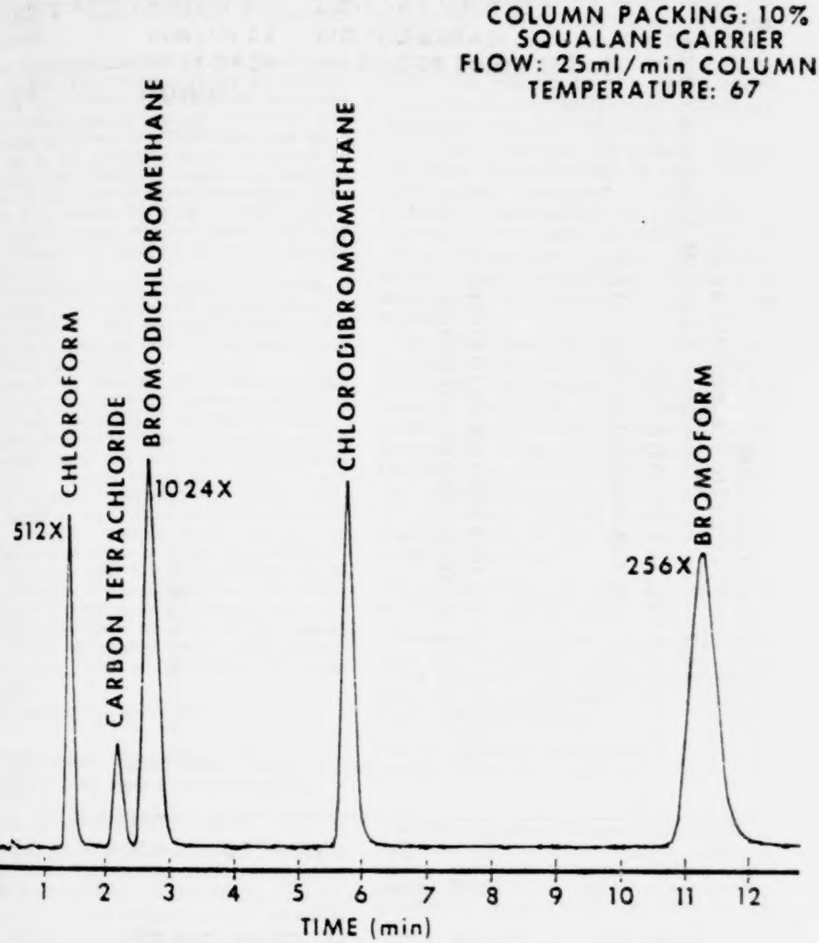

FIGURE 2. EXTRACT OF STANDARD

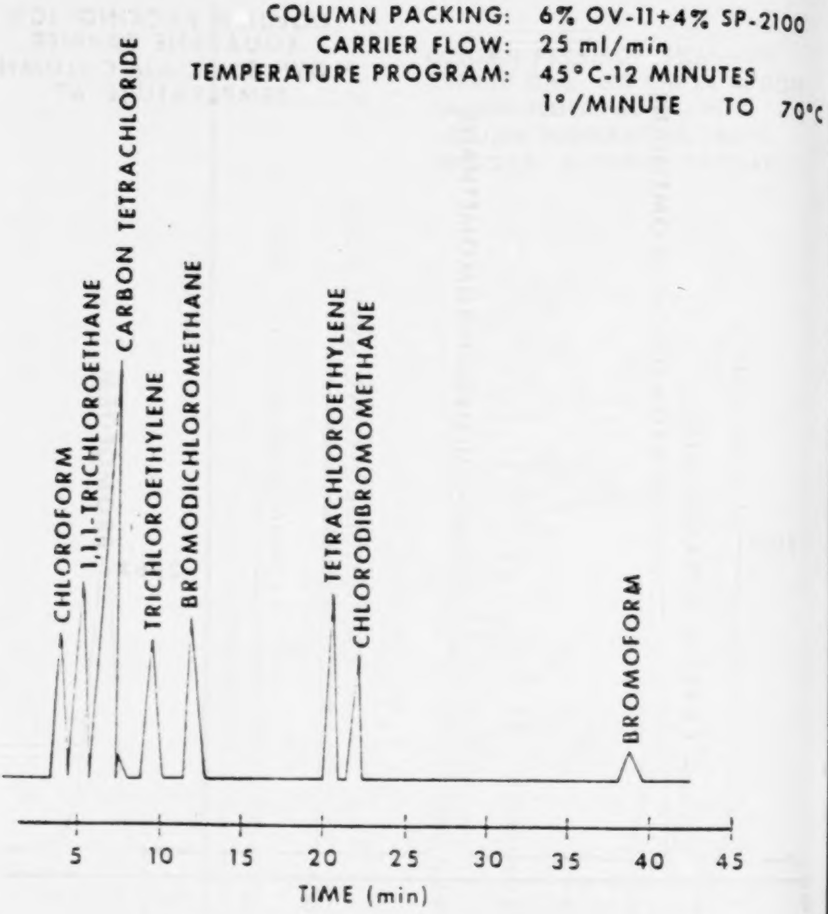

FIGURE 3. EXTRACT OF STANDARD

BILLING CODE 6560-01-C

PART III—DETERMINATION OF MAXIMUM TOTAL TRIHALOMETHANE POTENTIAL (MTP)

The water sample used for this determination is taken from a point in the distribution system that reflects maximum residence time. Procedures for sample collection and handling are given in EMSL Methods 501.1 and 501.2. No reducing agent is added to "quench" the chemical reaction producing THMs at the time of sample collection. The intent is to permit the level of THM precursors to be depleted and the concentration of the THMs to be maximized for the supply being tested.

Four experimental parameters affecting maximum THM production are pH, temperature, reaction time and the presence of a disinfectant residual. These parameters are dealt with as follows:

Measure the disinfectant residual at the selected sampling point. Proceed only if a measurable disinfectant residual is present. Collect triplicate 40 ml water samples at the pH prevailing at the time of sampling, and prepare a method blank according to the EMSL methods. Seal and store these samples together for 7 days at 25°C or above. After this time period, open one of the sample containers and check for disinfectant residual. Absence of a disinfectant residual invalidates the sample for further analyses. Once a disinfectant residual has been demonstrated, open another of the sealed samples and determine total THM concentration using either of the EMSL analytical methods.

[44 FR 68672, Nov. 29, 1979]

Subpart D—Reporting, Public Notification and Recordkeeping

§ 141.31 Reporting requirements.

(a) Except where a shorter period is specified in this part, the supplier of water shall report to the State the results of any test measurement or analysis required by this part within (1) the first ten days following the month in which the result is received, or (2) the first ten days following the end of the required monitoring period as stipulated by the State, whichever of these is shortest.

(b) Except where a different reporting period is specified in this part, the supplier of water must report to the State within 48 hours the failure to comply with any national primary drinking water regulation (including failure to comply with monitoring requirements) set forth in this part.

(c) The supplier of water is not required to report analytical results to the State in cases where a State laboratory performs the analysis and reports the results to the State office which would normally receive such notification from the supplier.

(d) The water supply system, within ten days of completion of each public notification required pursuant to § 141.32, shall submit to the State a representative copy of each type of notice distributed, published, posted, and/or made available to the persons served by the system and/or to the media.

(e) The water supply system shall submit to the State within the time stated in the request copies of any records required to be maintained under § 141.33 hereof or copies of any documents then in existence which the State or the Administrator is entitled to inspect pursuant to the authority of section 1445 of the Safe Drinking Water Act or the equivalent provisions of State law.

[40 FR 59570, Dec. 24, 1975, as amended at 45 FR 57345, Aug. 27, 1980]

EFFECTIVE DATE NOTE: At 54 FR 27566, June 29, 1989, §141.31 was amended by revising paragraph (b), effective December 31, 1990. For the convenience of the user, the superseded text follows:

§ 141.31 Reporting requirements.

* * * * *

(b) The supplier of water shall report to the State within 48 hours the failure to comply with any primary drinking water regulation (including failure to comply with monitoring requirements) set forth in this part.

* * * * *

§ 141.32 Public notification.

The requirements in this section are effective April 28, 1989. The requirements of § 141.36 apply until April 28, 1989.

(a) *Maximum contaminant level (MCL), treatment technique, and variance and exemption schedule violations.* The owner or operator of a public water system which fails to comply with an applicable MCL or treatment technique established by this part or which fails to comply with the requirements of any schedule prescribed pursuant to a variance or exemption, shall notify persons served by the system as follows:

(1) Except as provided in paragraph (a)(3) of this section, the owner or operator of a public water system must give notice:

(i) By publication in a daily newspaper of general circulation in the area served by the system as soon as possible, but in no case later than 14 days after the violation or failure. If the area served by a public water system is not served by a daily newspaper of general circulation, notice shall instead be given by publication in a weekly newspaper of general circulation serving the area; and

(ii) By mail delivery (by direct mail or with the water bill), or by hand delivery, not later than 45 days after the violation or failure. The State may waive mail or hand delivery if it determines that the owner or operator of the public water system in violation has corrected the violation or failure within the 45-day period. The State must make the waiver in writing and within the 45-day period; and

(iii) For violations of the MCLs of contaminants that may pose an acute risk to human health, by furnishing a copy of the notice to the radio and television stations serving the area served by the public water system as soon as possible but in no case later than 72 hours after the violation. The following violations are acute violations:

(A) Any violations specified by the State as posing an acute risk to human health.

(B) Violation of the MCL for nitrate as defined in § 141.11(b) and determined according to § 141.23(d).

(C) Violation of the MCL for total coliforms, when fecal coliforms or *E. coli* are present in the water distribution system, as specified in § 141.63(b).

(D) Occurrence of a waterborne disease outbreak, as defined in § 141.2, in an unfiltered system subject to the requirements of Subpart H of this part, after December 30, 1991 (see § 141.71(b)(4)).

(2) Except as provided in paragraph (a)(3) of this section, following the initial notice given under paragraph (a)(1) of this section, the owner or operator of the public water system must give notice at least once every three months by mail delivery (by direct mail or with the water bill) or by hand delivery, for as long as the violation or failure exists.

(3)(i) In lieu of the requirements of paragraphs (a) (1) and (2) of this section, the owner or operator of a community water system in an area that is not served by a daily or weekly newspaper of general circulation must give notice by hand delivery or by continuous posting in conspicuous places within the area served by the system. Notice by hand delivery or posting must begin as soon as possible, but no later than 72 hours after the violation or failure for acute violations (as defined in paragraph (a)(1)(iii) of this section), or 14 days after the violation or failure (for any other violation). Posting must continue for as long as the violation or failure exists. Notice by hand delivery must be repeated at least every three months for as long as the violation or failure exists.

(ii) In lieu of the requirements of paragraphs (a) (1) and (2) of this section, the owner or operator of a noncommunity water system may give notice by hand delivery or by continuous posting in conspicuous places within the area served by the system. Notice by hand delivery or posting must begin as soon as possible, but no later than 72 hours after the violation or failure for acute violations (as defined in paragraph (a)(1)((iii) of this section), or 14 days after the violation or failure (for any other violation). Posting must continue for as long as the violation or failure exists. Notice by hand delivery must be repeated at least every three months for as long as the violation or failure exists.

(b) *Other violations, variances, exemptions.* The owner or operator of a public water system which fails to perform monitoring required by section 1445(a) of the Act (including monitoring required by the National Primary Drinking Water Regulations (NPDWRs) of this part), fails to comply with a testing procedure established by this part, is subject to a variance granted under section

1415(a)(1)(A) or 1415(a)(2) of the Act, or is subject to an exemption under section 1416 of the Act, shall notify persons served by the system as follows:

(1) Except as provided in paragraph (b)(3) or (b)(4) of this section, the owner or operator of a public water system must give notice within three months of the violation or granting of a variance or exemption by publication in a daily newspaper of general circulation in the area served by the system. If the area served by a public water system is not served by a daily newspaper of general circulation, notice shall instead be given by publication in a weekly newspaper of general circulation serving the area.

(2) Except as provided in paragraph (b)(3) or (b)(4) of this section, following the initial notice given under paragraph (b)(1) of this section, the owner or operator of the public water system must give notice at least once every three months by mail delivery (by direct mail or with the water bill) or by hand delivery, for as long as the violation exists. Repeat notice of the existence of a variance or exemption must be given every three months for as long as the variance or exemption remains in effect.

(3) (i) In lieu of the requirements of paragraphs (b)(1) and (b)(2) of this section, the owner or operator of a community water system in an area that is not served by a daily or weekly newspaper of general circulation must give notice, within three months of the violation or granting of the variance or exemption, by hand delivery or by continuous posting in conspicuous places with the area served by the system. Posting must continue for as long as the violation exists or a variance or exemption remains in effects. Notice by hand delivery must be repeated at least every three months for as long as the violation exists or a variance or exemption remains in effect.

(ii) In lieu of the requirements of paragraphs (b)(1) and (b)(2) of this section, the owner or operator of a non-community water system may give otice, within three months of the vioation or the granting of the variance r exemption, by hand delivery or by ontinuous posting in conspicuous places within the area served by the system. Posting must continue for as long as the violation exists, or a variance or exemption remains in effect. Notice by hand delivery must be repeated at least every three months for as long as the violation exists or a variance or exemption remains in effect.

(4) In lieu of the requirements of paragraphs (b)(1), (b)(2), and (b)(3) of this section, the owner or operator of a public water system, at the discretion of the State, may provide less frequent notice for minor monitoring violations as defined by the State, if EPA has approved the State's application for a program revision under § 142.16. Notice of such violations must be given no less frequently than annually.

(c) *Notice to new billing units.* The owner or operator of a community water system must give a copy of the most recent public notice for any outstanding violation of any maximum contaminant level, or any treatment technique requirement, or any variance or exemption schedule to all new billing units or new hookups prior to or at the time service begins.

(d) *General content of public notice.* Each notice required by this section must provide a clear and readily understandable explanation of the violation, any potential adverse health effects, the population at risk, the steps that the public water system is taking to correct such violation, the necessity for seeking alternative water supplies, if any, and any preventive measures the consumer should take until the violation is corrected. Each notice shall be conspicuous and shall not contain unduly technical language, unduly small print, or similar problems that frustrate the purpose of the notice. Each notice shall include the telephone number of the owner, operator, or designee of the public water system as a source of additional information concerning the notice. Where appropriate, the notice shall be multilingual.

(e) *Mandatory health effects language.* When providing the information on potential adverse health effects required by paragraph (d) of this section in notices of violations of maximum contaminant levels or treatment technique requirements, or notices of the granting or the continued existence of exemptions or variances, or notices of failure to comply with a variance or exemption schedule, the owner or operator of a public water system shall include the language specified below for each contaminant. (If language for a particular contaminant is not specified below at the time notice is required, this paragraph does not apply.)

(1) *Trichloroethylene.* The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that trichloroethylene is a health concern at certain levels of exposure. This chemical is a common metal cleaning and dry cleaning fluid. It generally gets into drinking water by improper waste disposal. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed at lower levels over long periods of time. EPA has set forth the enforceable drinking water standard for trichloroethylene at 0.005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

(2) *Carbon tetrachloride.* The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that carbon tetrachloride is a health concern at certain levels of exposure. This chemical was once a popular household cleaning fluid. It generally gets into drinking water by improper waste disposal. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed at lower levels over long periods of of time. EPA has set the enforceable drinking water standard for carbon tetrachloride at 0.005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water which meets this standard i associated with little to none of thi risk and should be considered safe.

(3) *1,2-Dichloroethane.* The Unite States Environmental Protectio Agency (EPA) sets drinking wate standards and has determined tha 1,2-dichloroethane is a health concer at certain levels of exposure. Thi chemical is used as a cleaning fluid fo fats, oils, waxes, and resins. It genera ly gets into drinking water from improper waste disposal. This chemica has been shown to cause cancer in laboratory animals such as rats and mic when the animals are exposed at hig levels over their lifetimes. Chemical that cause cancer in laboratory an mals also may increase the risk cancer in humans who are exposed lower levels over long periods of tim EPA has set the enforceable drinkin water standard for 1,2-dichloroethan at 0.005 parts per million (ppm) reduce the risk of cancer or other a verse health effects which have bee observed in laboratory animals. Drin ing water which meets this standard associated with little to none of th risk and should be considered safe.

(4) *Vinyl chloride.* The United Stat Environmental Protection Agen (EPA) sets drinking water standar and has determined that vinyl chl ride is a health concern at certa levels of exposure. This chemical used in industry and is found in drin ing water as a result of the breakdo of related solvents. The solvents used as cleaners and degreasers metals and generally get into drinki water by improper waste disposal. Th chemical has been associated with s nificantly increased risks of canc among certain industrial workers w were exposed to relatively lar amounts of this chemical during th working careers. This chemical h also been shown to cause cancer in la oratory animals when the animals exposed at high levels over their li times. Chemicals that cause increas risk of cancer among exposed indust al workers and in laboratory anim also may increase the risk of cancer

humans who are exposed at lower levels over long periods of time. EPA has set the enforceable drinking water standard for vinyl chloride at 0.002 part per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in humans and laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

(5) *Benzene.* The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that benzene is a health concern at certain levels of exposure. This chemical is used as a solvent and degreaser of metals. It is also a major component of gasoline. Drinking water contamination generally results from leaking undergound gasoline and petroleum tanks or improper waste disposal. This chemical has been associated with significantly increased risks of leukemia among certain industrial workers who were exposed to relatively large amounts of this chemical during their working careers. This chemical has also been shown to cause cancer in laboratory animals when the animals are exposed at high levels over their lifetimes. Chemicals that cause increased risk of cancer among exposed industrial workers and in laboratory animals also may increase the risk of cancer in humans who are exposed at lower levels over long periods of time. EPA has set the enforceable drinking water standard for benzene at 0.005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in humans and laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

(6) *1,1-Dichloroethylene.* The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that 1,1-dichloroethylene is a health concern at certain levels of exposure. This chemical is used in industry and is found in drinking water as a result of the breakdown of related solvents. The solvents are used as cleaners and degreasers of metals and generally get into drinking water by improper waste disposal. This chemical has been shown to cause liver and kidney damage in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals which cause adverse effects in laboratory animals also may cause adverse health effects in humans who are exposed at lower levels over long periods of time. EPA has set the enforceable drinking water standard for 1,1-dichloroethylene at 0.007 parts per million (ppm) to reduce the risk of these adverse health effects which have been observed in laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

(7) *Para-dichlorobenzene.* The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that para-dichlorobenzene is a health concern at certain levels of exposure. This chemical is a component of deodorizers, moth balls, and pesticides. It generally gets into drinking water by improper waste disposal. This chemical has been shown to cause liver and kidney damage in laboratory animals such as rats and mice when the animals are exposed to high levels over their lifetimes. Chemicals which cause adverse effects in laboratory animals also may cause adverse health effects in humans who are exposed at lower levels over long periods of time. EPA has set the enforceable drinking water standard for para-dichlorobenzene at 0.075 parts per million (ppm) to reduce the risk of these adverse health effects which have been observed in laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

(8) *1,1,1-Trichloroethane.* The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that the 1,1,1-trichloroethane is a health concern at certain levels of exposure. This chemical is used as a cleaner and degreaser of metals. It generally gets into drinking water by improper waste disposal. This chemical has been shown to damage the liver, nervous

system, and circulatory system of laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Some industrial workers who were exposed to relatively large amounts of this chemical during their working careers also suffered damage to the liver, nervous system, and circulatory system. Chemicals which cause adverse effects among exposed industrial workers and in laboratory animals also may cause adverse health effects in humans who are exposed at lower levels over long periods of time. EPA has set the enforceable drinking water standard for 1,1,1-trichloroethane at 0.2 parts per million (ppm) to protect against the risk of these adverse health effects which have been observed in humans and laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

(9) *Fluoride.*

[NOTE: EPA is not specifying language that must be included in a public notice for a violation of the fluoride maximum contaminant level in this section because § 143.5 of this part includes the necessary information. See paragraph (f) of this section.]

(10) *Microbiological contaminants* (for use when there is a violation of the treatment technique requirements for filtration and disinfection in Subpart H of this part). The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that the presence of microbiological contaminants are a health concern at certain levels of exposure. If water is inadequately treated, microbiological contaminants in that water may cause disease. Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and any associated headaches and fatigue. These symptoms, however, are not just associated with disease-causing organisms in drinking water, but also may be caused by a number of factors other than your drinking water. EPA has set enforceable requirements for treating drinking water to reduce the risk of these adverse health effects. Treatment such as filtering and disinfecting the water removes or destroys microbiological contaminants. Drinking water which is treated to meet EPA requirements is associated with little to none of this risk and should be considered safe.

(11) *Total coliforms* (To be used when there is a violation of § 141.63(a), and not a violation of § 141.63(b)). The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that the presence of total coliforms is a possible health concern. Total coliforms are common in the environment and are generally not harmful themselves. The presence of these bacteria in drinking water, however, generally is a result of a problem with water treatment or the pipes which distribute the water, and indicates that the water may be contaminated with organisms that can cause disease. Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and any associated headaches and fatigue. These symptoms, however, are not just associated with disease-causing organisms in drinking water, but also may be caused by a number of factors other than your drinking water. EPA has set an enforceable drinking water standard for total coliforms to reduce the risk of these adverse health effects. Under this standard, no more than 5.0 percent of the samples collected during a month can contain these bacteria, except that systems collecting fewer than 40 samples/month that have one total coliform-positive sample per month are not violating the standard. Drinking water which meets this standard is usually not associated with a health risk from disease-causing bacteria and should be considered safe.

(12) *Fecal Coliforms/E. coli* (To be used when there is a violation of § 141.63(b) or both § 141.63(a) and (b)). The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that the presence of fecal coliforms or *E. coli* is a serious health concern. Fecal coliforms and *E. coli* are generally not harmful themselves, but their presence in drinking water is serious because they usually are associated with sewage or animal wastes. The presence of these bacteria in drinking water is generally a result of a prob-

lem with water treatment or the pipes which distribute the water, and indicates that the water may be contaminated with organisms that can cause disease. Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and associated headaches and fatigue. These symptoms, however, are not just associated with disease-causing organisms in drinking water, but also may be caused by a number of factors other than your drinking water. EPA has set an enforceable drinking water standard for fecal coliforms and *E. coli* to reduce the risk of these adverse health effects. Under this standard all drinking water samples must be free of these bacteria. Drinking water which meets this standard is associated with little or none of this risk and should be considered safe. State and local health authorities recommend that consumers take the following precautions: [To be inserted by the public water system, according to instructions from State or local authorities].

(f) *Public notices for fluoride.* Notice f violations of the maximum contaminant level for fluoride, notices of varances and exemptions from the maxinum contaminant level for fluoride, nd notices of failure to comply with ariance and exemption schedules for he maximum contaminant level for luoride shall consist of the public otice prescribed in § 143.5(b), plus a escription of any steps which the ystem is taking to come into complince.

(g) *Public notification by the State.* he State may give notice to the ublic required by this section on ehalf of the owner or operator of the ublic water system if the State comlies with the requirements of this secon. However, the owner or operator f the public water system remains leally responsible for ensuring that the equirements of this section are met.

2 FR 41546, Oct. 28, 1987, as amended at FR 15188, Apr. 17, 1989; 54 FR 27527, 566, June 29, 1989; 54 FR 27566, June 29, 89; 55 FR 25064, June 19, 1990]

Effective Date Note: At 54 FR 27527, ne 29, 1989, § 141.32 was amended by dding new paragraphs (a)(1)(iii)(D) and)(10), effective December 31, 1990.

Effective Date Note: At 54 FR 27566, June 29, 1989, § 141.32 was amended by adding paragraphs (a)(1)(iii)(C), (e)(11) and (12), effective December 31, 1990.

§ 141.33 Record maintenance.

Any owner or operator of a public water system subject to the provisions of this part shall retain on its premises or at a convenient location near its premises the following records:

(a) Records of bacteriological analyses made pursuant to this part shall be kept for not less than 5 years. Records of chemical analyses made pursuant to this part shall be kept for not less than 10 years. Actual laboratory reports may be kept, or data may be transferred to tabular summaries, provided that the following information is included:

(1) The date, place, and time of sampling, and the name of the person who collected the sample;

(2) Identification of the sample as to whether it was a routine distribution system sample, check sample, raw or process water sample or other special purpose sample;

(3) Date of analysis;

(4) Laboratory and person responsible for performing analysis;

(5) The analytical technique/method used; and

(6) The results of the analysis.

(b) Records of action taken by the system to correct violations of primary drinking water regulations shall be kept for a period not less than 3 years after the last action taken with respect to the particular violation involved.

(c) Copies of any written reports, summaries or communications relating to sanitary surveys of the system conducted by the system itself, by a private consultant, or by any local, State or Federal agency, shall be kept for a period not less than 10 years after completion of the sanitary survey involved.

(d) Records concerning a variance or exemption granted to the system shall be kept for a period ending not less than 5 years following the expiration of such variance or exemption.

§ 141.34 Public notice requirements pertaining to lead.

(a) *Applicability of public notice requirement.* (1) Except as provided in paragraph (a)(2) of this section, by June 19, 1988, the owner or operator of each community water system and each non-transient, non-community water system shall issue notice to persons served by the system that may be affected by lead contamination of their drinking water. The State may require subsequent notices. The owner or operator shall provide notice under this section even if there is no violation of the national primary drinking water regulation for lead.

(2) Notice under paragraph (a)(1) of this section is not required if the system demonstrates to the State that the water system, including the residential and non-residential portions connected to the water system, are lead free. For the purposes of this paragraph, the term "lead free" when used with respect to solders and flux refers to solders and flux containing not more than 0.2 percent lead, and when used with respect to pipes and pipe fittings refers to pipes and pipe fittings containing not more than 8.0 percent lead.

(b) *Manner of notice.* Notice shall be given to persons served by the system either by (1) three newspaper notices (one for each of three consecutive months and the first no later than June 19, 1988); or (2) once by mail notice with the water bill or in a separate mailing by June 19, 1988; or (3) once by hand delivery by June 19, 1988. For non-transient non-community water systems, notice may be given by continuous posting. If posting is used, the notice shall be posted in a conspicuous place in the area served by the system and start no later than June 19, 1988, and continue for three months.

(c) *General content of notice.* (1) Notices issued under this section shall provide a clear and readily understandable explanation of the potential sources of lead in drinking water, potential adverse health effects, reasonably available methods of mitigating known or potential lead content in drinking water, any steps the water system is taking to mitigate lead content in drinking water, and the necessity for seeking alternative water supplies, if any. Use of the mandatory language in paragraph (d) of this section in the notice will be sufficient to explain potential adverse health effects.

(2) Each notice shall also include specific advice on how to determine if materials containing lead have been used in homes or the water distribution system and how to minimize exposure to water likely to contain high levels of lead. Each notice shall be conspicuous and shall not contain unduly technical language, unduly small print, or similar problems that frustrate the purpose of the notice. Each notice shall contain the telephone number of the owner, operator, or designee of the public water system as a source of additional information regarding the notice. Where appropriate, the notice shall be multilingual.

[NOTE: (Optional Information): Each notice should advise persons served by the system to use only the cold water faucet for drinking and for use in cooking or preparing baby formula, and to run the water until it gets as cold as it is going to get before each use. If there has recently been major water use in the household, such as showering or bathing, flushing toilets, or doing laundry with cold water, flushing the pipes should take 5 to 30 seconds; if not, flushing the pipes could take as long as several minutes. Each notice should also advise persons served by the system to check to see if lead pipes, solder, or flux have been used in plumbing that provides tap water and to ensure that new plumbing and plumbing repairs use lead-free materials.

The only way to be sure of the amount of lead in the household water is to have the water tested by a competent laboratory. Testing is especially important to apartment dwellers because flushing may not be effective in high-rise buildings that have lead-soldered central piping. As appropriate, the notice should provide information on testing.]

(d) *Mandatory health effects information.* When providing the information in public notices required under paragraph (c) of this section on the potential adverse health effects of lead in drinking water, the owner or operator of the water system shall include the following specific language in the notice:

"The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that lead is a health concern at certain levels of exposure. There is currently a standard of 0.050 parts per million (ppm). Based on new health information, EPA is likely to lower this standard significantly.

"Part of the purpose of this notice is to inform you of the potential adverse health effects of lead. This is being done even though your water may not be in violation of the current standard.

"EPA and others are concerned about lead in drinking water. Too much lead in the human body can cause serious damage to the brain, kidneys, nervous system, and red blood cells. The greatest risk, even with short-term exposure, is to young children and pregnant women.

"Lead levels in your drinking water are likely to be highest:

—if your home or water system has lead pipes, or

—if your home has copper pipes with lead solder, and

—if the home is less than five years old, or

—if you have soft or acidic water, or

—if water sits in the pipes for several hours."

(e) *Notice by the State.* The State may give notice to the public required by this section on behalf of the owner or operator of the water system if the State meets the requirements of paragraph (b) and the notice contains all the information specified in paragraphs (c) and (d) of this section. However, the owner or operator of the water system remains legally responsible for ensuring that the requirements of this section are met.

(f) *Enforcement by the State.* All States shall enforce the requirements of this section by June 19, 1988, as required by section 1417(b)(2) of the Act. If the Administrator determines that a State is not enforcing these requirements, the Administrator may withhold up to five percent of the State program grant fund under section 1443(a) of the Act.

[52 FR 41549, Oct. 28, 1987]

§ 141.35 Reporting and public notification for certain unregulated contaminants.

(a) The requirements of this section only apply to the contaminants listed in § 141.40.

(b) The owner or operator of a community water system or non-transient, non-community water system who is required to monitor under § 141.40 shall send a copy of the results of such monitoring within 30 days of receipt and any public notice under paragraph (d) of this section to the State.

(c) The State, or the community water system or non-transient, non-community water system if the State has not adopted regulations equivalent to § 141.40, shall furnish the following information to the Administrator for each sample analyzed under § 141.40:

(1) Results of all analytical methods, including negatives;

(2) Name and address of the system that supplied the sample;

(3) Contaminant(s);

(4) Analytical method(s) used;

(5) Date of sample;

(6) Date of analysis.

(d) The owner or operator shall notify persons served by the system of the availability of the results of sampling conducted under § 141.40 by including a notice in the first set of water bills issued by the system after the receipt of the results or written notice within three months. The notice shall identify a person and supply the telephone number to contact for information on the monitoring results. For surface water systems, public notification is required only after the first quarter's monitoring and must include a statement that additional monitoring will be conducted for three more quarters with the results available upon request.

[52 FR 25714, July 8, 1987; 53 FR 25110, July 1, 1988]

EDITORIAL NOTE: At 52 FR 25714, July 8, 1987 as corrected at 53 FR 25110, July 1, 1988, § 141.35 was added to Subpart D. The document provided that the information collection requirements in § 141.35 "are effective January 1, 1988, if the information collection request is cleared by the Office of Management and Budget (OMB) and an OMB clearance number is assigned prior to that date. If not, the requirements will be effective when OMB clears the request and a notice is published."

Subpart E—Special Regulations, Including Monitoring Regulations and Prohibition on Lead Use

§ 141.40 Special monitoring for organic chemicals.

(a) All community and non-transient, non-community water systems shall monitor for the contaminants listed in paragraph (e) in this section by date specified in Table 1:

TABLE 1.—MONITORING SCHEDULE BY SYSTEM SIZE

Number of persons served	Monitoring to begin no later than—
Over 10,000	Jan. 1, 1988
3,300 to 10,000	Jan. 1, 1989.
Less than 3,300	Jan. 1, 1991.

(b) Surface water systems shall sample at points in the distribution system representative of each water source or at entry points to the distribution system after any application of treatment. The minimum number of samples is one year of quarterly samples per water source.

(c) Ground water systems shall sample at points of entry to the distribution system representative of each well after any application of treatment. The minimum number of samples is one sample per entry point to the distribution system.

(d) The State may require confirmation samples for positive or negative results.

(e) Community water systems and non-transient, non-community water systems shall monitor for the following contaminants except as provided in paragraph (f) of this section:

(1) Chloroform;
(2) Bromodichloromethane;
(3) Chlorodibromomethane;
(4) Bromoform;
(5) trans-1,2-Dichloroethylene;
(6) Chlorobenzene;
(7) m-Dichlorobenzene;
(8) Dichloromethane;
(9) cis-1,2-Dichloroethylene;
(10) o-Dichlorobenzene;
(11) Dibromomethane;
(12) 1,1-Dichloropropene;
(13) Tetrachloroethylene;
(14) Toluene;
(15) p-Xylene;
(16) o-Xylene;
(17) m-Xylene;
(18) 1,1-Dichloroethane;
(19) 1,2-Dichloropropane;
(20) 1,1,2,2-Tetrachloroethane;
(21) Ethylbenzene;
(22) 1,3-Dichloropropane;
(23) Styrene;
(24) Chloromethane;
(25) Bromomethane;
(26) 1,2,3-Trichloropropane;
(27) 1,1,1,2-Tetrachloroethane;
(28) Chloroethane;
(29) 1,1,2-Trichloroethane;
(30) 2,2-Dichloropropane;
(31) o-Chlorotoluene;
(32) p-Chlorotoluene;
(33) Bromobenzene;
(34) 1,3-Dichloropropene;
(35) Ethylene dibromide (EDB);
(36) 1,2-Dibromo-3-chloropropane (DBCP).

(f) Community water systems and non-transient non-community water systems must monitor for EDB and DBCP only if the State determines they are vulnerable to contamination by either or both of these substances. For the purpose of this paragraph, a vulnerable system is defined as a system which is potentially contaminated by EDB and DBCP, including surface water systems where these two compounds are applied, manufactured, stored, disposed of, or shipped upstream, and for ground-water systems in areas where the compounds are applied, manufactured, stored, disposed of, or shipped in the ground-water recharge basin, or for ground-water systems that are in proximity to underground storage tanks that contain leaded gasoline.

(g) Analysis under this section shall be conducted using the recommended EPA methods as follows, or their equivalent as determined by EPA: 502.1, "Volatile Halogenated Organic Compounds in Water by Purge and Trap Gas Chromatography," 503.1, "Volatile Aromatic and Unsaturated Organic Compounds in Water by Purge and Trap Gas Chromatography," 524.1, "Volatile Organic Compounds in Water by Purge and Trap Gas Chromatography/Mass Spectrometry," 524.2, "Volatile Organic Compounds in Water by Purge and Trap

Capillary Column Gas Chromatography/Mass Spectrometry, or 502.2, "Volatile Organic Compounds in Water by Purge and Trap Gas Chromatography with Photoionization and Electrolytic Conductivity Detectors in Series." These methods are contained in "Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water," September 1986, available from Environmental Monitoring and Support Laboratory (EMSL), EPA, Cincinnati, Ohio 45268. Analysis of 1,2-dibromo-3-chloropropane (DBCP) and 1,2-dibromoethane (EDB) shall be conducted by Method 504, "Measurement of 1,2,-Dibromoethane (EDB) and 1,2-Dibromo-3-chloropropane (DBCP) in Drinking Water by Microextraction and Gas Chromatography," September 1986, available from EMSL, Cincinnati, Ohio 45268 or the State.

(h) Analysis under this section shall only be conducted by laboratories approved under § 141.24(g)(11). In addition to the requirements of § 141.24(g)(11), each laboratory analyzing for EDB and DBCP must achieve a method detection limit for EDB and DBCP of 0.00002 mg/l, according to the procedures in Appendix B of Part 136.

(i) Public water systems may use monitoring data collected any time after January 1, 1983 to meet the requirements for unregulated monitoring, provided that the monitoring program was consistent with the requirements of this section. In addition, the results of EPA's Ground Water Supply Survey may be used in a similar manner for systems supplied by a single well.

(j) Monitoring for the following compounds is required at the discretion of the State:

(1) 1,2,4-Trimethylbenzene;
(2) 1,2,4-Trichlorobenzene;
(3) 1,2,3-Trichlorobenzene;
(4) n-Propylbenzene;
(5) n-Butylbenzene;
(6) Naphthalene;
(7) Hexachlorobutadiene;
(8) 1,3,5-Trimethylbenzene;
(9) p-Isopropyltoluene;
(10) Isopropylbenzene;
(11) Tert-butylbenzene;
(12) Sec-butylbenzene;
(13) Fluorotrichloromethane;
(14) Dichlorodifluoromethane;
(15) Bromochloromethane.

(k) Instead of performing the monitoring required by this section, a community water system or non-transient non-community water system serving fewer than 150 service connections may send a letter to the State stating that the system is available for sampling. This letter must be sent to the State no later than January 1, 1991. The system shall not send such samples to the State, unless requested to do so by the State.

(l) All community and non-transient, non-community water systems shall repeat the monitoring required in § 141.40 no less frequently than every five years from the dates specified in § 141.40(a).

(m) States or public water systems may composite up to five samples when monitoring for substances in § 141.40 (e) and (j) of this section.

[52 FR 25715, July 8, 1987; 53 FR 25110, July 1, 1988]

EDITORIAL NOTE: At 52 FR 25715, July 8, 1987, as corrected at 53 FR 25110, July 1, 1988, § 141.40 was revised. The document provided that the information collection requirements in § 141.40 "are effective January 1, 1988, if the information collection request is cleared by the Office of Management and Budget (OMB) and an OMB clearance number is assigned prior to that date. If not, the requirements will be effective when OMB clears the request and a notice is published." The text in effect until OMB clearance is obtained is shown below.

§ 141.40 Special monitoring for organic chemicals.

(a) The Administrator may designate, by publication in the FEDERAL REGISTER, public water systems which are required to take water samples, provide information, and in appropriate cases analyze water samples for the purpose of providing information on contamination of drinking water sources and of treated water by organic chemicals.[1]

(b) The Administrator shall provide to each public system designated pursuant to paragraph (a) of this section a written schedule for the sampling of source water or treated water by the system, with written instructions for the sampling methods and for handling of samples. The schedule may designate the locations or types of locations to be sampled.

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[1] A list of designated public water systems was published at 41 FR 5281, January 5, 1976.

(c) In cases where the public water system has a laboratory capable of analyzing samples for constituents specified by the Administrator, the Administrator may require analyses to be made by the public water system for submission to EPA. If the Administrator requires the analyses to be made by the public water system, he shall provide the system with written instructions as to the analytical procedures to be followed, or with references to technical documents describing the analytical procedures.

(d) Public water systems designated by the Administrator pursuant to paragraph (a) of this section shall provide to the Administrator, upon request, information to be used in the evaluation of analytical results, including records of previous monitoring and analyses, information on possible sources of contamination and treatment techniques used by the system.

[40 FR 59588, Dec. 24, 1975]

§ 141.41 Special monitoring for sodium.

(a) Suppliers of water for community public water systems shall collect and analyze one sample per plant at the entry point of the distribution system for the determination of sodium concentration levels; samples must be collected and analyzed annually for systems utilizing surface water sources in whole or in part, and at least every three years for systems utilizing solely ground water sources. The minimum number of samples required to be taken by the system shall be based on the number of treatment plants used by the system, except that multiple wells drawing raw water from a single aquifer may, with the State approval, be considered one treatment plant for determining the minimum number of samples. The supplier of water may be required by the State to collect and analyze water samples for sodium more frequently in locations where the sodium content is variable.

(b) The supplier of water shall report to EPA and/or the State the results of the analyses for sodium within the first 10 days of the month following the month in which the sample results were received or within the first 10 days following the end of the required monitoring period as stipulated by the State, whichever of these is first. If more than annual sampling is required the supplier shall report the average sodium concentration within 10 days of the month following the month in which the analytical results of the last sample used for the annual average was received. The supplier of water shall not be required to report the results to EPA where the State has adopted this regulation and results are reported to the State. The supplier shall report the results to EPA where the State has not adopted this regulation.

(c) The supplier of water shall notify appropriate local and State public health officials of the sodium levels by written notice by direct mail within three months. A copy of each notice required to be provided by this paragraph shall be sent to EPA and/or the State within 10 days of its issuance. The supplier of water is not required to notify appropriate local and State public health officials of the sodium levels where the State provides such notices in lieu of the supplier.

(d) Analyses for sodium shall be performed by the flame photometric method in accordance with the procedures described in "Standard Methods for the Examination of Water and Wastewater," 14th Edition, pp. 250-253; or by Method 273.1, Atomic Absorption—Direct Aspiration or Method 273.2, Atomic Absorption—Graphite Furnace, in "Methods for Chemical Analysis of Water and Waste," EMSL, Cincinnati, EPA, 1979; or by Method D1428-64(a) in Annual Book of ASTM Standards, Part 31, Water.

[45 FR 57345, Aug. 27, 1980]

§ 141.42 Special monitoring for corrosivity characteristics.

(a) Suppliers of water for community public water systems shall collect samples from a representative entry point to the water distribution system for the purpose of analysis to determine the corrosivity characteristics of the water.

(1) The supplier shall collect two samples per plant for analysis for each plant using surface water sources wholly or in part or more if required by the State; one during mid-winter and one during mid-summer. The supplier of the water shall collect one

sample per plant for analysis for each
plant using ground water sources or
more if required by the State. The
minimum number of samples required
to be taken by the system shall be
based on the number of treatment
plants used by the system, except that
nultiple wells drawing raw water from
a single aquifer may, with the State
approval, be considered one treatment
plant for determining the minimum
number of samples.

(2) Determination of the corrosivity
haracteristics of the water shall in-
lude measurement of pH, calcium
ardness, alkalinity, temperature,
otal dissolved solids (total filterable
esidue), and calculation of the Lange-
ier Index in accordance with para-
raph (c) of this section. The determi-
ation of corrosivity characteristics
hall only include one round of sam-
ling (two samples per plant for sur-
ace water and one sample per plant
or ground water sources). However,
tates may require more frequent
onitoring as appropriate. In addi-
on, States have the discretion to re-
uire monitoring for additional param-
ters which may indicate corrosivity
haracteristics, such as sulfates and
lorides. In certain cases, the Aggres-
ve Index, as described in paragraph
), can be used instead of the Lange-
er Index; the supplier shall request
writing to the State and the State
ll make this determination.

(b) The supplier of water shall
port to EPA and/or the State the re-
lts of the analyses for the corrosi-
ty characteristics within the first 10
ys of the month following the
onth in which the sample results
re received. If more frequent sam-
ng is required by the State, the sup-
er can accumulate the data and
all report each value within 10 days
the month following the month in
ich the analytical results of the last
mple was received. The supplier of
ter shall not be required to report
results to EPA where the State
s adopted this regulation and re-
ts are reported to the State.

c) Analyses conducted to determine
corrosivity of the water shall be
de in accordance to the following
thods:

(1) Langelier Index—"Standard Methods for the Examination of Water and Wastewater," 14th Edition, Method 203, pp. 61-63.

(2) Aggressive Index—"AWWA Standard for Asbestos-Cement Pipe, 4 in. through 24 in. for Water and Other Liquids," AWWA C400-77, Revision of C400-75, AWWA, Denver, Colorado.

(3) Total Filtrable Residue—"Standard Methods for the Examination of Water and Wastewater," 14th Edition, Method 208B, pp. 92-93; or "Methods for Chemical Analysis of Water and Wastes," Method 160.1.

(4) Temperature—"Standard Methods for the Examination of Water and Wastewater," 14th Edition, Method 212, pp. 125-126.

(5) Calcium—EDTA titrimetric method "Standard Methods for the Examination of Water and Wastewater," 14th Edition. Method 306C, pp. 189-191; or "Annual Book of ASTM Standards," Method D-1126-67B; "Methods for Chemical Analysis of Water and Wastes," Method 215.2.

(6) Alkalinity—Methyl Orange end point pH 4.5. "Standard Methods for the Examination of Water and Wastewater," 14th Edition, Method 403, pp. 278-281; or "Annual Book of ASTM Standards," Method D1067-70B; or "Methods for Chemical Analysis of Water and Wastes," Method 310.1.

(7) pH—"Standard Methods for the Examination of Water and Wastewater," 14th Edition, Method 424, pp. 460-465; or "Methods for Chemical Analysis of Water and Wastes," Method 150.1; or "Annual Book of ASTM Standards," Method D-1293-78A or B.

(8) Chloride—Potentiometric Method, "Standard Methods for the Examination of Water and Wastewater," 14th Edition, p. 306.

(9) Sulfate—Turbidimetric Method, "Methods for Chemical Analysis of Water and Wastes," pp. 277-278, EPA, Office of Technology Transfer, Washington, DC, 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 14th Edition, pp. 496-498.

(d) Community water supply systems shall identify whether the following construction materials are present in their distribution system and report to the State:

Lead from piping, solder, caulking, interior lining of distribution mains, alloys and home plumbing.
Copper from piping and alloys, service lines, and home plumbing.
Galvanized piping, service lines, and home plumbing.
Ferrous piping materials such as cast iron and steel.
Asbestos cement pipe.

In addition, States may require identification and reporting of other materials of construction present in distribution systems that may contribute contaminants to the drinking water, such as:

Vinyl lined asbestos cement pipe.
Coal tar lined pipes and tanks.

[45 FR 57346, Aug. 27, 1980; 47 FR 10999, Mar. 12, 1982]

§ 141.43 Prohibition on use of lead pipes, solder, and flux.

(a) *In general*—(1) *Prohibition.* Any pipe, solder, or flux, which is used after June 19, 1986, in the installation or repair of—

(i) Any public water system, or

(ii) Any plumbing in a residential or nonresidential facility providing water for human consumption which is connected to a public water system shall be lead free as defined by paragraph (d) of this section. This paragraph (a)(1) shall not apply to leaded joints necessary for the repair of cast iron pipes.

(2) Each public water system shall identify and provide notice to persons that may be affected by lead contamination of their drinking water where such contamination results from either or both of the following:

(i) The lead content in the construction materials of the public water distribution system,

(ii) Corrosivity of the water supply sufficient to cause leaching of lead.

Notice shall be provided notwithstanding the absence of a violation of any national drinking water standard. The manner and form of notice are specified in § 141.34 of this part.

(b) *State enforcement*—(1) *Enforcement of prohibition.* The requirements of paragraph (a)(1) of this section shall be enforced in all States effective June 19, 1988. States shall enforce such requirements through State or local plumbing codes, or such other means of enforcement as the State may determine to be appropriate.

(2) *Enforcement of public notice requirements.* The requirements of paragraph (a)(2) of this section, shall apply in all States effective June 19, 1988.

(c) *Penalties.* If the Administrator determines that a State is not enforcing the requirements of paragraph (a) of this section, as required pursuant to paragraph (b) of this section, the Administrator may withhold up to 5 percent of Federal funds available to that State for State program grants under section 1443(a) of the Act.

(d) *Definition of lead free.* For purposes of this section, the term "lead free"

(1) When used with respect to solders and flux refers to solders and flux containing not more than 0.2 percent lead, and

(2) When used with respect to pipes and pipe fittings refers to pipes and pipe fittings containing not more than 8.0 percent lead.

[52 FR 20674, June 2, 1987]

Subpart F—Maximum Contaminant Level Goals

§ 141.50 Maximum contaminant level goals for organic contaminants.

(a) MCLGs are zero for the following contaminants:

(1) Benzene
(2) Vinyl chloride
(3) Carbon tetrachloride
(4) 1,2-dichloroethane
(5) Trichloroethylene

(b) MCLGs for the following contaminants are as indicated:

Contaminant	MCLG in mg/l
(1) 1,1-Dichloroethylene	0.007
(2) 1,1,1-Trichloroethane	0.20
(3) para-Dichlorobenzene	0.075

[50 FR 46901, Nov. 13, 1985, as amended at 52 FR 20674, June 2, 1987; 52 FR 25716, July 8, 1987]

§ 141.51 Maximum contaminant level goals for inorganic contaminants.

(a) [Reserved]

(b) MCLGs for the following contaminants are as indicated:

Contaminant	MCLG in mg/L
(1) Fluoride	4.0
(2) [Reserved]	

[50 FR 47155, Nov. 14, 1985, as amended at 52 FR 20674, June 2, 1987]

§ 141.52 Maximum contaminant level goals for microbiological contaminants.

MCLGs for the following contaminants are as indicated:

Contaminant	MCLG
(1) *Giardia lamblia*	zero
(2) Viruses	zero
(3) *Legionella*	zero
(4) Total coliforms (including fecal coliforms and *Escherichia coli*).	Zero.

[54 FR 27527, 27566, June 29, 1989; 55 FR 25064, June 19, 1990]

EFFECTIVE DATE NOTE: At 54 FR 27527, June 29, 1989, § 141.52 was added, effective December 31, 1990.

EFFECTIVE DATE NOTE: At 54 FR 27566, June 29, 1989, § 141.52 was amended by adding a new entry "(4)" to the table, effective December 31, 1990.

EFFECTIVE DATE NOTE: At 55 FR 25064, June 19, 1990, § 141.52 was amended by inserting a period following the word "contaminants" in the section heading, effective December 31, 1990.

Subpart G—National Revised Primary Drinking Water Regulations: Maximum Contaminant Levels

§ 141.60 Effective dates.

(a) The effective date for § 141.61 is January 9, 1989.

(b) The effective date for § 141.62(b)(1) is October 2, 1987.

[52 FR 25716, July 8, 1987; 53 FR 25111, July 1, 1988]

§ 141.61 Maximum contaminant levels for organic contaminants.

(a) The following maximum contaminant levels for organic contaminants apply to community water systems and non-transient non-community water systems.

CAS No.	Contaminant	Maximum contaminant level in mg/l
71–43–2	Benzene	0.005
75–01–4	Vinyl chloride	0.002
56–23–5	Carbon tetrachloride	0.005
107–06–2	1,2-Dichloroethane	0.005
79–01–6	Trichloroethylene	0.005
75–35–4	1,1-Dichloroethylene	0.007
71–55–6	1,1,1-Trichloroethane	0.20
106–46–7	para-Dichlorobenzene	0.075

(b) The Administrator, pursuant to section 1412 of the Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for synthetic organic chemicals (§ 141.61(a)): central treatment using packed tower aeration; central treatment using granular activated carbon for all these chemicals except vinyl chloride.

[52 FR 25716, July 8, 1987; 53 FR 25111, July 1, 1988]

§ 141.62 Maximum contaminant levels for inorganic contaminants.

(a) [Reserved]

(b) The following maximum contaminant levels for inorganic contaminants apply to community water systems.

Contaminant	Maximum contaminant level in mg/l
(1) Fluoride	4.0
(2) [Reserved]	

[51 FR 11411, Apr. 2, 1986]

§ 141.63 Maximum contaminant levels (MCLs) for microbiological contaminants.

(a) The MCL is based on the presence or absence of total coliforms in a sample, rather than coliform density.

(1) For a system which collects at least 40 samples per month, if no more than 5.0 percent of the samples collected during a month are total coliform-positive, the system is in compliance with the MCL for total coliforms.

(2) For a system which collects fewer than 40 samples/month, if no more than one sample collected during a month is total coliform-positive, the system is in compliance with the MCL for total coliforms.

(b) Any fecal coliform-positive repeat sample or *E. coli*-positive repeat sample, or any total coliform-positive repeat sample following a fecal coliform-positive or *E. coli*-positive routine sample constitutes a violation of the MCL for total coliforms. For purposes of the public notification requirements in § 141.32, this is a violation that may pose an acute risk to health.

(c) A public water system must determine compliance with the MCL for total coliforms in paragraphs (a) and (b) of this section for each month in which it is required to monitor for total coliforms.

(d) The Administrator, pursuant to section 1412 of the Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant level for total coliforms in paragraphs (a) and (b) of this section:

(1) Protection of wells from contamination by coliforms by appropriate placement and construction;

(2) Maintenance of a disinfectant residual throughout the distribution system;

(3) Proper maintenance of the distribution system including appropriate pipe replacement and repair procedures, main flushing programs, proper operation and maintenance of storage tanks and reservoirs, and continual maintenance of positive water pressure in all parts of the distribution system;

(4) Filtration and/or disinfection of surface water, as described in Subpart H, or disinfection of ground water using strong oxidants such as chlorine, chlorine dioxide, or ozone; and

(5)For systems using ground water, compliance with the requirements of an EPA-approved State Wellhead Protection Program developed and implemented under Section 1428 of the SDWA.

[54 FR 27566, June 29, 1989; 55 FR 25064, June 19, 1990]

EFFECTIVE DATE NOTE: At 54 FR 27566, June 29, 1989, §141.63 was added, effective December 31, 1990.

EFFECTIVE DATE NOTE: At 55 FR 25064, June 19, 1990, in § 141.63, paragraph (d)(4) was amended and paragraph (d)(5) was revised, effective December 31, 1990.

Subpart H—Filtration and Disinfection

SOURCE: 54 FR 27527, June 29, 1989, unless otherwise noted.

EFFECTIVE DATE NOTE: At 54 FR 27527, June 27, 1989, Subpart H was added, effective December 31, 1990.

§ 141.70 General requirements.

(a) The requirements of this Subpart H constitute national primary drinking water regulations. These regulations establish criteria under which filtration is required as a treatment technique for public water systems supplied by a surface water source and public water systems supplied by a ground water source under the direct influence of surface water. In addition, these regulations establish treatment technique requirements in lieu of maximum contaminant levels for the following contaminants: *Giardia lamblia*, viruses, heterotrophic plate count bacteria, *Legionella*, and turbidity. Each public water system with a surface water source or a ground water source under the direct influence of surface water must provide treatment of that source water that complies with these treatment technique requirements. The treatment technique requirements consist of installing and properly operating water treatment processes which reliably achieve:

(1) At least 99.9 percent (3-log) removal and/or inactivation of *Giardia lamblia* cysts between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer; and

(2) At least 99.99 percent (4-log) removal and/or inactivation of viruses

etween a point where the raw water ; not subject to recontamination by urface water runoff and a point ownstream before or at the first cus- omer.

(b) A public water system using a urface water source or a ground water ource under the direct influence of urface water is considered to be in ompliance with the requirements of aragraph (a) of this section if:

(1) It meets the requirements for voiding filtration in § 141.71 and the isinfection requirements in 141.72(a); or

(2) It meets the filtration require- ents in § 141.73 and the disinfection equirements in § 141.72(b).

(c) Each public water system using a urface water source or a ground water ource under the direct influence of urface water must be operated by ualified personnel who meet the re- uirements specified by the State.

141.71 Criteria for avoiding filtration.

A public water system that uses a urface water source must meet all of e conditions of paragraphs (a) and) of this section, and is subject to aragraph (c) of this section, begin- ing December 30, 1991, unless the tate has determined, in writing pur- uant to § 1412(b)(7)(C)(iii), that fil- ation is required. A public water stem that uses a ground water urce under the direct influence of rface water must meet all of the nditions of paragraphs (a) and (b) of is section and is subject to para- aph (c) of this section, beginning 18 onths after the State determines at it is under the direct influence of rface water, or December 30, 1991, hichever is later, unless the State s determined, in writing pursuant to 1412(b)(7)(C)(iii), that filtration is quired. If the State determines in riting pursuant to § 1412(b)(7)(C)(iii) fore December 30, 1991, that filtra- on is required, the system must have stalled filtration and meet the crite- for filtered systems specified in 141.72(b) and 141.73 by June 29, 93. Within 18 months of the failure a system using surface water or a ound water source under the direct fluence of surface water to meet any e of the requirements of paragraphs (a) and (b) of this section or after June 29, 1993, whichever is later, the system must have installed filtration and meet the criteria for filtered systems specified in §§ 141.72(b) and 141.73.

(a) *Source water quality conditions.* (1) The fecal coliform concentration must be equal to or less than 20/100 ml, or the total coliform concentration must be equal to or less than 100/100 ml (measured as specified in § 141.74 (a)(1) and (2) and (b)(1)), in representative samples of the source water immediately prior to the first or only point of disinfectant application in at least 90 percent of the measurements made for the 6 previous months that the system served water to the public on an ongoing basis. If a system measures both fecal and total coliforms, the fecal coliform criterion, but not the total coliform criterion, in this paragraph must be met.

(2) The turbidity level cannot exceed 5 NTU (measured as specified in § 141.74 (a)(4) and (b)(2)) in representative samples of the source water immediately prior to the first or only point of disinfectant application unless: (i) the State determines that any such event was caused by circumstances that were unusual and unpredictable; and (ii) as a result of any such event, there have not been more than two events in the past 12 months the system served water to the public, or more than five events in the past 120 months the system served water to the public, in which the turbidity level exceeded 5 NTU. An "event" is a series of consecutive days during which at least one turbidity measurement each day exceeds 5 NTU.

(b) *Site-specific conditions.* (1)(i) The public water system must meet the requirements of § 141.72(a)(1) at least 11 of the 12 previous months that the system served water to the public, on an ongoing basis, unless the system fails to meet the requirements during 2 of the 12 previous months that the system served water to the public, and the State determines that at least one of these failures was caused by circumstances that were unusual and unpredictable.

(ii) The public water system must meet the requirements of

§ 141.72(a)(2) at all times the system serves water to the public.

(iii) The public water system must meet the requirements of § 141.72(a)(3) at all times the system serves water to the public unless the State determines that any such failure was caused by circumstances that were unusual and unpredictable.

(iv) The public water system must meet the requirements of § 141.72(a)(4) on an ongoing basis unless the State determines that failure to meet these requirements was not caused by a deficiency in treatment of the source water.

(2) The public water system must maintain a watershed control program which minimizes the potential for contamination by *Giardia lamblia* cysts and viruses in the source water. The State must determine whether the watershed control program is adequate to meet this goal. The adequacy of a program to limit potential contamination by *Giardia lamblia* cysts and viruses must be based on: the comprehensiveness of the watershed review; the effectiveness of the system's program to monitor and control detrimental activities occurring in the watershed; and the extent to which the water system has maximized land ownership and/or controlled land use within the watershed. At a minimum, the watershed control program must:

(i) Characterize the watershed hydrology and land ownership;

(ii) Identify watershed characteristics and activities which may have an adverse effect on source water quality; and

(iii) Monitor the occurrence of activities which may have an adverse effect on source water quality.

The public water system must demonstrate through ownership and/or written agreements with landowners within the watershed that it can control all human activities which may have an adverse impact on the microbiological quality of the source water. The public water system must submit an annual report to the State that identifies any special concerns about the watershed and how they are being handled; describes activities in the watershed that affect water quality; and projects what adverse activities are expected to occur in the future and describes how the public water system expects to address them. For systems using a ground water source under the direct influence of surface water, an approved wellhead protection program developed under section 1428 of the Safe Drinking Water Act may be used, if the State deems it appropriate, to meet these requirements.

(3) The public water system must be subject to an annual on-site inspection to assess the watershed control program and disinfection treatment process. Either the State or a party approved by the State must conduct the on-site inspection. The inspection must be conducted by competent individuals such as sanitary and civil engineers, sanitarians, or technicians who have experience and knowledge about the operation and maintenance of a public water system, and who have a sound understanding of public health principles and waterborne diseases. A report of the on-site inspection summarizing all findings must be prepared every year. The on-site inspection must indicate to the State's satisfaction that the watershed control program and disinfection treatment process are adequately designed and maintained. The on-site inspection must include:

(i) A review of the effectiveness of the watershed control program;

(ii) A review of the physical condition of the source intake and how well it is protected;

(iii) A review of the system's equipment maintenance program to ensure there is low probability for failure of the disinfection process;

(iv) An inspection of the disinfection equipment for physical deterioration;

(v) A review of operating procedures;

(vi) A review of data records to ensure that all required tests are being conducted and recorded and disinfection is effectively practiced; and

(vii) Identification of any improvements which are needed in the equipment, system maintenance and operation, or data collection.

(4) The public water system must not have been identified as a source of a waterborne disease outbreak, or if it has been so identified, the syst must have been modified sufficien

to prevent another such occurrence, as determined by the State.

(5) The public water system must comply with the maximum contaminant level (MCL) for total coliforms in § 141.63 at least 11 months of the 12 previous months that the system served water to the public, on an ongoing basis, unless the State determines that failure to meet this requirement was not caused by a deficiency in treatment of the source water.

(6) The public water system must comply with the requirements for trihalomethanes in §§ 141.12 and 141.30.

(c) *Treatment technique violations.* (1) A system that (i) fails to meet any one of the criteria in paragraphs (a) and (b) of this section and/or which the State has determined that filtration is required, in writing pursuant to § 1412(b)(7)(C)(iii), and (ii) fails to install filtration by the date specified in the introductory paragraph of this section is in violation of a treatment technique requirement.

(2) A system that has not installed filtration is in violation of a treatment technique requirement if:

(i) The turbidity level (measured as specified in § 141.74(a)(4) and (b)(2)) in a representative sample of the source water immediately prior to the first or only point of disinfection application exceeds 5 NTU; or

(ii) The system is identified as a source of a waterborne disease outbreak.

§ 141.72 Disinfection.

A public water system that uses a surface water source and does not provide filtration treatment must provide the disinfection treatment specified in paragraph (a) of this section beginning December 30, 1991, unless the State determines that filtration is required in writing pursuant to § 1412(b)(7)(C)(iii). A public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment must provide disinfection treatment specified in paragraph (a) of this section beginning December 30, 1991, or 18 months after the State determines that the ground water source is under the influence of surface water, whichever is later, unless the State has determined that filtration is required in writing pursuant to § 1412(b)(7)(C)(iii). If the State has determined that filtration is required, the system must comply with any interim disinfection requirements the State deems necessary before filtration is installed. A system that uses a surface water source that provides filtration treatment must provide the disinfection treatment specified in paragraph (b) of this section beginnng June 29, 1993, or beginning when filtration is installed, whichever is later. A system that uses a ground water source under the direct influence of surface water and provides filtration treatment must provide disinfection treatment as specified in paragraph (b) of this section by June 29, 1993, or beginning when filtration is installed, whichever is later. Failure to meet any requirement of this section after the applicable date specified in this introductory paragraph is a treatment technique violation.

(a) *Disinfection requirements for public water systems that do not provide filtration.* Each public water system that does not provide filtration treatment must provide disinfection treatment as follows:

(1) The disinfection treatment must be sufficient to ensure at least 99.9 percent (3-log) inactivation of *Giardia lamblia* cysts and 99.99 percent (4-log) inactivation of viruses, every day the system serves water to the public, except any one day each month. Each day a system serves water to the public, the public water system must calculate the CT value(s) from the system's treatment parameters, using the procedure specified in § 141.74(b)(3), and determine whether this value(s) is sufficient to achieve the specified inactivation rates for *Giardia lamblia* cysts and viruses. If a system uses a disinfectant other than chlorine, the system may demonstrate to the State, through the use of a State-approved protocol for on-site disinfection challenge studies or other information satisfactory to the State, that $CT_{99.9}$ values other than those specified in Tables 2.1 and 3.1 in § 141.74(b)(3) or other operational parameters are adequate to demonstrate that the system is achieving minimum inactivation

rates required by paragraph (a)(1) of this section.

(2) The disinfection system must have either (i) redundant components, including an auxiliary power supply with automatic start-up and alarm to ensure that disinfectant application is maintained continuously while water is being delivered to the distribution system, or (ii) automatic shut-off of delivery of water to the distribution system whenever there is less than 0.2 mg/l of residual disinfectant concentration in the water. If the State determines that automatic shut-off would cause unreasonable risk to health or interfere with fire protection, the system must comply with paragraph (a)(2)(i) of this section.

(3) The residual disinfectant concentration in the water entering the distribution system, measured as specified in § 141.74(a)(5) and (b)(5), cannot be less than 0.2 mg/l for more than 4 hours.

(4)(i) The residual disinfectant concentration in the distribution system, measured as total chlorine, combined chlorine, or chlorine dioxide, as specified in § 141.74(a)(5) and (b)(6), cannot be undetectable in more than 5 percent of the samples each month, for any two consecutive months that the system serves water to the public. Water in the distribution system with a heterotrophic bacteria concentration less than or equal to 500/ml, measured as heterotrophic plate count (HPC) as specified in § 141.74(a)(3), is deemed to have a detectable disinfectant residual for purposes of determining compliance with this requirement. Thus, the value "V" in the following formula cannot exceed 5 percent in one month, for any two consecutive months.

$$V = \frac{c+d+e}{a+b} \times 100$$

where:

a=number of instances where the residual disinfectant concentration is measured;

b=number of instances where the residual disinfectant concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;

c=number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

d=number of instances where the residual disinfectant concentration is measured but not detected and where the HPC is >500/ml; and

e=number of instances where the residual disinfectant concentration is not measured and HPC is >500/ml.

(ii) If the State determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified by § 141.74(a)(3) and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (a)(4)(i) of this section do not apply to that system.

(b) *Disinfection requirements for public water systems which provide filtration.* Each public water system that provides filtration treatment must provide disinfection treatment as follows.

(1) The disinfection treatment must be sufficient to ensure that the total treatment processes of that system achieve at least 99.9 percent (3-log) inactivation and/or removal of *Giardia lamblia* cysts and at least 99.99 percent (4-log) inactivation and/or removal of viruses, as determined by the State.

(2) The residual disinfectant concentration in the water entering the distribution system, measured as specified in § 141.74 (a)(5) and (c)(2), cannot be less than 0.2 mg/l for more than 4 hours.

(3)(i) The residual disinfectant concentration in the distribution system, measured as total chlorine, combined chlorine, or chlorine dioxide, as specified in § 141.74 (a)(5) and (c)(3), cannot be undetectable in more than 5 percent of the samples each month, for any two consecutive months that the system serves water to the public. Water in the distribution system with a heterotrophic bacteria concentration less than or equal to 500/ml, measured as heterotrophic plate count (HPC) as specified in § 141.74(a)(3), is deemed to have a detectable disinfectant residual for purposes of determining compliance with this requirement. Thus, the value "V" in the following formula cannot exceed 5 percent in one month, for any two consecutive months.

$$V = \frac{c+d+e}{a+b} \times 100$$

where:

a=number of instances where the residual disinfectant concentration is measured;

b=number of instances where the residual disinfectant concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;

c=number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

d=number of instances where no residual disinfectant concentration is detected and where the HPC is >500/ml; and

e=number of instances where the residual disinfectant concentration is not measured and HPC is >500/ml.

(ii) If the State determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified in § 141.74(a)(3) and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (b)(3)(i) of this section do not apply.

§ 141.73 Filtration.

A public water system that uses a surface water source or a ground water source under the direct influence of surface water, and does not meet all of the criteria in § 141.71 (a) and (b) for avoiding filtration, must provide treatment consisting of both disinfection, as specified in § 141.72(b), and filtration treatment which complies with the requirements of paragraph (a), (b), (c), (d), or (e) of this section by June 29, 1993, or within 18 months of the failure to meet any one of the criteria for avoiding filtration in § 141.71 (a) and (b), whichever is later. Failure to meet any requirement of this section after the date specified in this introductory paragraph is a treatment technique violation.

(a) *Conventional filtration treatment or direct filtration.* (1) For systems using conventional filtration or direct filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 0.5 NTU in at least 95 percent of the measurements taken each month, measured as specified in § 141.74 (a)(4) and (c)(1), except that if the State determines that the system is capable of achieving at least 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts at some turbidity level higher than 0.5 NTU in at least 95 percent of the measurements taken each month, the State may substitute this higher turbidity limit for that system. However, in no case may the State approve a turbidity limit that allows more than 1 NTU in more than 5 percent of the samples taken each month, measured as specified in § 141.74 (a)(4) and (c)(1).

(2) The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU, measured as specified in § 141.74 (a)(4) and (c)(1).

(b) *Slow sand filtration.* (1) For systems using slow sand filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 1 NTU in at least 95 percent of the measurements taken each month, measured as specified in § 141.74 (a)(4) and (c)(1), except that if the State determines there is no significant interference with disinfection at a higher turbidity level, the State may substitute this higher turbidity limit for that system.

(2) The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU, measured as specified in § 141.74 (a)(4) and (c)(1).

(c) *Diatomaceous earth filtration.* (1) For systems using diatomaceous earth filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 1 NTU in at least 95 percent of the measurements taken each month, measured as specified in § 141.74 (a)(4) and (c)(1).

(2) The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU,

measured as specified in § 141.74 (a)(4) and (c)(1).

(d) *Other filtration technologies.* A public water system may use a filtration technology not listed in paragraphs (a)-(c) of this section if it demonstrates to the State, using pilot plant studies or other means, that the alternative filtration technology, in combination with disinfection treatment that meets the requirements of § 141.72(b), consistently achieves 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts and 99.99 percent removal and/or inactivation of viruses. For a system that makes this demonstration, the requirements of paragraph (b) of this section apply.

§ 141.74 Analytical and monitoring requirements.

(a) *Analytical requirements.* Only the analytical method(s) specified in this paragraph, or otherwise approved by EPA, may be used to demonstrate compliance with the requirements of §§ 141.71, 141.72, and 141.73. Measurements for pH, temperature, turbidity, and residual disinfectant concentrations must be conducted by a party approved by the State. Measurements for total coliforms, fecal coliforms, and HPC must be conducted by a laboratory certified by the State or EPA to do such analysis. Until laboratory certification criteria are developed for the analysis of HPC and fecal coliforms, any laboratory certified for total coliform analysis by EPA is deemed certified for HPC and fecal coliform analysis. The following procedures shall be performed in accordance with the publications listed in the following section. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies of the methods published in *Standard Methods for the Examination of Water and Wastewater* may be obtained from the American Public Health Association et al., 1015 Fifteenth Street, NW., Washington, DC 20005; copies of the Minimal Medium ONPG-MUG Method as set forth in the article "National Field Evaluation of a Defined Substrate Method for the Simultaneous Enumeration of Total Coliforms and *Esherichia coli* from Drinking Water: Comparison with the Standard Multiple Tube Fermentation Method" (Edberg et al.), Applied and Environmental Microbiology, Volume 54, pp. 1595-1601, June 1988 (as amended under Erratum, Applied and Environmental Microbiology, Volume 54, p. 3197, December, 1988), may be obtained from the American Water Works Association Research Foundation, 6666 West Quincy Avenue, Denver, Colorado, 80235; and copies of the Indigo Method as set forth in the article "Determination of Ozone in Water by the Indigo Method" (Bader and Hoigne), may be obtained from Ozone Science & Engineering, Pergamon Press Ltd., Fairview Park, Elmsford, New York 10523. Copies may be inspected at the U.S. Environmental Protection Agency, Room EB15, 401 M Street, SW., Washington, DC 20460 or at the Office of the Federal Register, 1100 L Street, NW., Room 8401, Washington, DC.

(1) Fecal coliform concentration—Method 908C (Fecal Coliform MPN Procedures), pp. 878-880, Method 908D (Estimation of Bacterial Density), pp. 880-882, or Method 909C (Fecal Coliform Membrane Filter Procedure), pp. 896-898, as set forth in *Standard Methods for the Examination of Water and Wastewater,* 1985, American Public Health Association et al., 16th edition.

(2) Total coliform concentration—Method 908A (Standard Total Coliform Multiple—Tube (MPN) Tests), pp. 872-876, Method 908B (Application of Tests to Routine Examinations), pp. 876-878, Method 908D (Estimation of Bacterial Density), pp. 880-882, Method 909A (Standard Total Coliform Membrane Filter Procedure), pp. 887-894, or Method 909B (Delayed-Incubation Total Coliform Procedure), pp. 894-896, as set forth in *Standard Methods for the Examination of Water and Wastewater,* 1985, American Public Health Association et al., 16th edition; Minimal Medium ONPG-MUG Test, as set forth in the article "National Field Evaluation of a Defined Substrate Method for the Simultaneous Enumeration of Total Coliforms and *Escherichia coli* from Drinking Water: Comparison with the

Standard Multiple Tube Fermentation Method" (Edberg et al.), Applied and Environmental Microbiology, Volume 54, pp. 1595–1601, June 1988 (as amended under Erratum, Volume 54, p. 3197, December, 1988).

(NOTE: The Minimal Medium ONPG-MUG Test is sometimes referred to as the Autoanalysis Colilert System). Systems may use a five-tube test or a ten-tube test.

(3) Heterotrophic Plate Count—Method 907A (Pour Plate Method), pp. 864–866, as set forth in *Standard Methods for the Examination of Water and Wastewater,* 1985, American Public Health Association et al., 16th edition.

(4) Turbidity—Method 214A (Nephelometric Method—Nephelometric Turbidity Units), pp. 134–136, as set forth in *Standard Methods for the Examination of Water and Wastewater,* 1985, American Public Health Association et al., 16th edition.

(5) Residual disinfectant concentration—Residual disinfectant concentrations for free chlorine and combined chlorine (chloramines) must be measured by Method 408C (Amperometric Titration Method), pp. 303–306, Method 408D (DPD Ferrous Titrimetric Method), pp. 306–309, Method 408E (DPD Colorimetric Method), pp. 309–310, or Method 408F (Leuco Crystal Violet Method), pp. 310–313, as set forth in *Standard Methods for the Examination of Water and Wastewater,* 1985, American Public Health Association et al., 16th edition. Residual disinfectant concentrations for free chlorine and combined chlorine may also be measured by using DPD colorimetric test kits if approved by the State. Residual disinfectant concentrations for ozone must be measured by the Indigo Method as set forth in Bader, H., Hoigne, J., "Determination of Ozone in Water by the Indigo Method; A Submitted Standard Method"; Ozone Science and Engineering, Vol. 4, pp. 169–176, Pergamon Press Ltd., 1982, or automated methods which are calibrated in reference to the results obtained by the Indigo Method on a regular basis, if approved by the State.

NOTE: This method will be published in the 17th edition of *Standard Methods for the Examination of Water and Wastewater,* American Public Health Association et al.; the Iodometric Method in the 16th edition may not be used.

Residual disinfectant concentrations for chlorine dioxide must be measured by Method 410B (Amperometric Method) or Method 410C (DPD Method), pp. 322–324, as set forth in *Standard Methods for the Examination of Water and Wastewater,* 1985, American Public Health Association et al., 16th edition.

(6) Temperature—Method 212 (Temperature), pp. 126–127, as set forth in *Standard Methods for the Examination of Water and Wastewater,* 1985, American Public Health Association et al., 16th edition.

(7) pH—Method 423 (pH Value), pp. 429–437, as set forth in *Standard Methods for the Examination of Water and Wastewater,* 1985, American Public Health Association, 16th edition.

(b) *Monitoring requirements for systems that do not provide filtration.* A public water system that uses a surface water source and does not provide filtration treatment must begin monitoring, as specified in this paragraph (b), beginning December 31, 1990, unless the State has determined that filtration is required in writing pursuant to § 1412(b)(7)(C)(iii), in which case the State may specify alternative monitoring requirements, as appropriate, until filtration is in place. A public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment must begin monitoring as specified in this paragraph (b) beginning December 31, 1990, or 6 months after the State determines that the ground water source is under the direct influence of surface water, whichever is later, unless the State has determined that filtration is required in writing pursuant to § 1412(b)(7)(C)(iii), in which case the State may specify alternative monitoring requirements, as appropriate, until filtration is in place.

(1) Fecal coliform or total coliform density measurements as required by § 141.71(a)(1) must be performed on representative source water samples immediately prior to the first or only point of disinfectant application. The system must sample for fecal or total

coliforms at the following minimum frequency each week the system serves water to the public:

System size (persons served)	Samples/ week[1]
<500	1
501 to 3,300	2
3,301 to 10,000	3
10,001 to 25,000	4
>25,000	5

[1] Must be taken on separate days.

Also, one fecal or total coliform density measurement must be made every day the system serves water to the public and the turbidity of the source water exceeds 1 NTU (these samples count towards the weekly coliform sampling requirement) unless the State determines that the system, for logistical reasons outside the system's control, cannot have the sample analyzed within 30 hours of collection.

(2) Turbidity measurements as required by § 141.71(a)(2) must be performed on representative grab samples of source water immediately prior to the first or only point of disinfectant application every four hours (or more frequently) that the system serves water to the public. A public water system may substitute continuous turbidity monitoring for grab sample monitoring if it validates the continuous measurement for accuracy on a regular basis using a protocol approved by the State.

(3) The total inactivation ratio for each day that the system is in operation must be determined based on the $CT_{99.9}$ values in Tables 1.1-1.6, 2.1, and 3.1 of this section, as appropriate. The parameters necessary to determine the total inactivation ratio must be monitored as follows:

(i) The temperature of the disinfected water must be measured at least once per day at each residual disinfectant concentration sampling point.

(ii) If the system uses chlorine, the pH of the disinfected water must be measured at least once per day at each chlorine residual disinfectant concentration sampling point.

(iii) The disinfectant contact time(s) ("T") must be determined for each day during peak hourly flow.

(iv) The residual disinfectant concentration(s) ("C") of the water before or at the first customer must be measured each day during peak hourly flow.

(v) If a system uses a disinfectant other than chlorine, the system may demonstrate to the State, through the use of a State-approved protocol for on-site disinfection challenge studies or other information satisfactory to the State, that $CT_{99.9}$ values other than those specified in Tables 2.1 and 3.1 in this section other operational parameters are adequate to demonstrate that the system is achieving the minimum inactivation rates required by § 141.72(a)(1).

TABLE 1.1—CT VALUES ($CT_{99.9}$) FOR 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY FREE CHLORINE AT 0.5 °C OR LOWER [1]

Residual (mg/l)	pH						
	<6.0	6.5	7.0	7.5	8.0	8.5	<9.0
<0.4	137	163	195	237	277	329	390
0.6	141	168	200	239	286	342	407
0.8	145	172	205	246	295	354	422
1.0	148	176	210	253	304	365	437
1.2	152	180	215	259	313	376	451
1.4	155	184	221	266	321	387	464
1.6	157	189	226	273	329	397	477
1.8	162	193	231	279	338	407	489
2.0	165	197	236	286	346	417	500
2.2	169	201	242	297	353	426	511
2.4	172	205	247	298	361	435	522
2.6	175	209	252	304	368	444	533
2.8	178	213	257	310	375	452	543
3.0	181	217	261	316	382	460	552

[1] These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature and at the higher pH.

TABLE 1.2— CT VALUES ($CT_{99.9}$) for 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY FREE CHLORINE AT 5.0 °C[1]

Free residual (mg/l)	pH						
	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
≤0.4	97	117	139	166	198	236	[illegible]
0.6	100	120	143	171	204	244	[illegible]
0.8	103	122	146	175	210	252	[illegible]
1.0	105	125	149	179	216	260	[illegible]
1.2	107	127	152	183	221	267	[illegible]
1.4	109	130	155	187	227	274	[illegible]
1.6	111	132	158	192	232	281	[illegible]
1.8	114	135	162	196	238	287	[illegible]

TABLE 1.2— CT VALUES (CT $_{99.9}$) for 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY FREE CHLORINE AT 5.0 °C[1]—Continued

Free residual (mg/l)	pH						
	≦6.0	6.5	7.0	7.5	8.0	8.5	≦9.0
2.0	116	138	165	200	243	294	353
2.2	118	140	169	204	248	300	361
2.4	120	143	172	209	253	306	368
2.6	122	146	175	213	258	312	375
2.8	124	148	178	217	263	318	382
3.0	126	151	182	221	268	324	389

[1] These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the CT$_{99.9}$ value at the lower temperature, and at the higher pH.

TABLE 1.3— CT VALUES (CT $_{99.9}$) for 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY FREE CHLORINE AT 10.0 °C[1]

Free residual (mg/l)	pH						
	≦6.0	6.5	7.0	7.5	8.0	8.5	≦9.0
≦0.4	73	88	104	125	149	177	209
0.6	75	90	107	128	153	183	218
0.8	78	92	110	131	158	189	226
1.0	79	94	112	134	162	195	234
1.2	80	95	114	137	166	200	240
1.4	82	98	116	140	170	206	247
1.6	83	99	119	144	174	211	253
1.8	86	101	122	147	179	215	259
2.0	87	104	124	150	182	221	265
2.2	89	105	127	153	186	225	271
2.4	90	107	129	157	190	230	276
2.6	92	110	131	160	194	234	281
2.8	93	111	134	163	197	239	287
3.0	95	113	137	166	201	243	292

[1] These CT values achieve greater than a 99.99 percent nactivation of viruses. CT values between the indicated pH alues may be determined by linear interpolation. CT values etween the indicated temperatures of different tables may e determined by linear interpolation. If no interpolation is sed, use the CT$_{99.9}$ value at the lower temperature, and at he higher pH.

TABLE 1.4— CT VALUES (CT $_{99.9}$) for 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY FREE CHLORINE AT 15.0 °C[1]

Free residual (mg/l)	pH						
	≦6.0	6.5	7.0	7.5	8.0	8.5	≦9.0
≦0.4	49	59	70	83	99	118	140
0.6	50	60	72	86	102	122	146
0.8	52	61	73	88	105	126	151
1.0	53	63	75	90	108	130	156
1.2	54	64	76	92	111	134	160
1.4	55	65	78	94	114	137	165
1.6	56	66	79	96	116	141	169
1.8	57	68	81	98	119	144	173
2.0	58	69	83	100	122	147	177
2.2	59	70	85	102	124	150	181
2.4	60	72	86	105	127	153	184
2.6	61	73	88	107	129	156	188
2.8	62	74	89	109	132	159	191
3.0	63	76	91	111	134	162	195

[1] These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the CT$_{99.9}$ value at the lower temperature, and at the higher pH.

TABLE 1.5—CT Values (CT$_{99.9}$) FOR 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY FREE CHLORINE AT 20 °C[1]

Free residual (mg/l)	pH						
	< 6.0	6.5	7.0	7.5	8.0	8.5	< 9.0
< 0.4	36	44	52	62	74	89	105
0.6	38	45	54	64	77	92	109
0.8	39	46	55	66	79	95	113
1.0	39	47	56	67	81	98	117
1.2	40	48	57	69	83	100	120
1.4	41	49	58	70	85	103	123
1.6	42	50	59	72	87	105	126
1.8	43	51	61	74	89	108	129
2.0	44	52	62	75	91	110	132
2.2	44	53	63	77	93	113	135
2.4	45	54	65	78	95	115	138
2.6	46	55	66	80	97	117	141
2.8	47	56	67	81	99	119	143
3.0	47	57	68	83	101	122	146

[1] These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the CT$_{99.9}$ value at the lower temperature, and at the higher pH.

TABLE 1.6—CT Values (CT$_{99.9}$) FOR 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY FREE CHLORINE AT 25 °C[1] AND HIGHER

Free residual (mg/l)	pH						
	< 6.0	6.5	7.0	7.5	8.0	8.5	< 9.0
< 0.4	24	29	35	42	50	59	70
0.6	25	30	36	43	51	61	73
0.8	26	31	37	44	53	63	75

TABLE 1.6—CT Values ($CT_{99.9}$) FOR 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY FREE CHLORINE AT 25 °C[1] AND HIGHER—Continued

Free residual (mg/l)	pH						
	< 6.0	6.5	7.0	7.5	8.0	8.5	< 9.0
1.0	26	31	37	45	54	65	78
1.2	27	32	38	46	55	67	80
1.4	27	33	39	47	57	69	82
1.6	28	33	40	48	58	70	84
1.8	29	34	41	49	60	72	86
2.0	29	35	41	50	61	74	88
2.2	30	35	42	51	62	75	90
2.4	30	36	43	52	63	77	92
2.6	31	37	44	53	65	78	94

TABLE 1.6—CT Values ($CT_{99.9}$) FOR 99.9 PER- CENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY FREE CHLORINE AT 25 °C[1] AND HIGHER—Continued

Free residual (mg/l)	pH						
	< 6.0	6.5	7.0	7.5	8.0	8.5	< 9.0
2.8	31	37	45	54	66	80	96
3.0	32	38	46	55	67	81	97

[1] These CT values achieve greater than a 99.99 percen inactivation of viruses. CT values between the indicated p values may be determined by linear interpolation. CT valu between the indicated temperatures of different tables ma be determined by linear interpolation. If no interpolation i used, use the $CT_{99.9}$ value at the lower temperature, and a the higher pH.

TABLE 2.1—CT VALUES ($CT_{99.9}$) FOR 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY CHLORINE DIOXIDE AND OZONE[1]

	Temperature					
	< 1 °C	5 °C	10 °C	15 °C	20 °C	> 25
Chlorine dioxide	63	26	23	19	15	11
Ozone	2.9	1.9	1.4	0.95	0.72	0.4

[1] These CT values achieve greater than 99.99 percent inactivation of viruses. CT values between the indicated temperatu may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperatu determining $CT_{99.9}$ values between indicated temperatures.

TABLE 3.1—CT VALUES ($CT_{99.9}$) FOR 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY CHLORAMINES[1]

Temperature					
< 1 °C	5 °C	10 °C	15 °C	20 °C	25 °C
3,800	2,200	1,850	1,500	1,100	750

[1] These values are for pH values of 6 to 9. These CT values may be assumed to achieve greater than 99.99 percent inactivation of viruses only if chlorine is added and mixed in the water prior to the addition of ammonia. If this condition is not met, the system must demonstrate, based on on-site studies or other information, as approved by the State, that the system is achieving at least 99.99 percent inactivation of viruses. CT values between the indicated temperatures may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature for determining $CT_{99.9}$ values between indicated temperatures.

(4) The total inactivation ratio must be calculated as follows:

(i) If the system uses only one poin of disinfectant application, the syster may determine the total inactivatio ratio based on either of the followin two methods:

(A) One inactivation ratio (CTcalc $CT_{99.9}$) is determined before or at th first customer during peak hourly flo and if the CTcalc/$CT_{99.9}$ $>$ 1.0, the 99 percent *Giardia lamblia* inactivatio requirement has been achieved; or

(B) Successive CTcalc/$CT_{99.9}$ value representing sequential inactivatio ratios, are determined between th point of disinfectant application and point before or at the first custom during peak hourly flow. Under th alternative, the following metho must be used to calculate the total i activation ratio:

(1) Determine $\frac{\text{CTcalc}}{CT_{99.9}}$ for each sequence.

(2) Add the $\frac{CTcalc}{CT_{99.9}}$ values together $\left(\sum \frac{(CTcalc)}{CT_{99.9}} \right)$

(3) If $\sum \left(\frac{CTcalc}{CT_{99.9}} \right) > 1.0$, the 99.9 percent *Giardia lamblia* inactivation requirement has been achieved.

(ii) If the system uses more than one point of disinfectant application before or at the first customer, the system must determine the CT value of each disinfection sequence immediately prior to the next point of disinfectant application during peak hourly flow. The CTcalc/$CT_{99.9}$ value of each sequence and

$$\sum \frac{CTcalc}{CT_{99.9}}$$

must be calculated using the method in paragraph (b)(4)(i)(B) of this section to determine if the system is in compliance with § 142.72(a).

(iii) Although not required, the total percent inactivation for a system with one or more points of residual disinfectant concentration monitoring may be calculated by solving the following equation:

$$\text{Percent inactivation} = 100 - \frac{100}{10^z}$$

$$\text{where } z = 3 \times \sum \left(\frac{CTcalc}{CT_{99.9}} \right)$$

(5) The residual disinfectant concentration of the water entering the distribution system must be monitored continuously, and the lowest value must be recorded each day, except that if there is a failure in the continuous monitoring equipment, grab sampling every 4 hours may be conducted in lieu of continuous monitoring, but for no more than 5 working days following the failure of the equipment, and systems serving 3,300 or fewer persons may take grab samples in lieu of providing continous monitoring on an ongoing basis at the frequencies prescribed below:

System size by population	Samples/ day[1]
<500	1
501 to 1,000	2
1,001 to 2,500	3
2,501 to 3,300	4

[1] The day's samples cannot be taken at the same time. The sampling intervals are subject to State review and approval.

If at any time the residual disinfectant concentration falls below 0.2 mg/l in a system using grab sampling in lieu of continuous monitoring, the system must take a grab sample every 4 hours until the residual concentration is equal to or greater than 0.2 mg/l.

(6)(i) The residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in § 141.21, except that the State may allow a public water system which uses both a surface water source or a ground water source under direct influence of surface water, and a ground water source, to take disinfectant residual samples at points other than the total coliform sampling points if the State determines that such points are more representative of treated (disinfected) water quality within the distribution system. Heterotrophic bacteria, measured as heterotrophic plate count (HPC) as specified in paragraph (a)(3) of this section, may be measured in lieu of residual disinfectant concentration.

(ii) If the State determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified by paragraph (a)(3) of this section and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (b)(6)(i) of this section do not apply to that system.

(c) *Monitoring requirements for systems using filtration treatment.* A public water system that uses a surface water source or a ground water source under the influence of surface water and provides filtration treatment must monitor in accordance with this paragraph (c) beginning June 29, 1993, or when filtration is installed, whichever is later.

(1) Turbidity measurements as required by § 141.73 must be performed on representative samples of the system's filtered water every four hours (or more frequently) that the system serves water to the public. A public water system may substitute continuous turbidity monitoring for grab sample monitoring if it validates the continuous measurement for accuracy on a regular basis using a protocol approved by the State. For any systems using slow sand filtration or filtration treatment other than conventional treatment, direct filtration, or diatomaceous earth filtration, the State may reduce the sampling frequency to once per day if it determines that less frequent monitoring is sufficient to indicate effective filtration performance. For systems serving 500 or fewer persons, the State may reduce the turbidity sampling frequency to once per day, regardless of the type of filtration treatment used, if the State determines that less frequent monitoring is sufficient to indicate effective filtration performance.

(2) The residual disinfectant concentration of the water entering the distribution system must be monitored continuously, and the lowest value must be recorded each day, except that if there is a failure in the continuous monitoring equipment, grab sampling every 4 hours may be conducted in lieu of continuous monitoring, but for no more than 5 working days following the failure of the equipment, and systems serving 3,300 or fewer persons may take grab samples in lieu of providing continuous monitoring on an ongoing basis at the frequencies each day prescribed below:

System size by population	Samples/day[1]
±500	1
501 to 1,000	2
1,001 to 2,500	3
2,501 to 3,300	4

[1] The day's samples cannot be taken at the same time. The sampling intervals are subject to State review and approval.

If at any time the residual disinfectant concentration falls below 0.2 mg/l in a system using grab sampling in lieu of continuous monitoring, the system must take a grab sample every 4 hours until the residual disinfectant concentration is equal to or greater than 0.2 mg/l.

(3)(i) The residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in § 141.21, except that the State may allow a public water system which uses both a surface water source or a ground water source under direct influence of surface water, and a ground water source to take disinfectant residual samples at points other than the total coliform sampling points if the State determines that such points are more representative of treated (disinfected) water quality within the distribution system. Heterotrophic bacteria, measured as heterotrophic plate count (HPC) as specified in paragraph (a)(3) of this section, may be measured in lieu of residual disinfectant concentration.

(ii) If the State determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified by paragraph (a)(3) of this section and that the ystem is providing adequate disinfecion in the distribution system, the requirements of paragraph (c)(3)(i) of his section do not apply to that ystem.

141.75 Reporting and recordkeeping requirements.

(a) A public water system that uses a urface water source and does not proide filtration treatment must report nonthly to the State the information pecified in this paragraph (a) beginning December 31, 1990, unless the tate has determined that filtration is equired in writing pursuant to section 412(b)(7)(C)(iii), in which case the tate may specify alternative reportg requirements, as appropriate, until ltration is in place. A public water ystem that uses a ground water ource under the direct influence of rface water and does not provide filation treatment must report month- to the State the information specied in this paragraph (a) beginning ecember 31, 1990, or 6 months after e State determines that the ground ater source is under the direct influce of surface water, whichever is ter, unless the State has determined at filtration is required in writing rsuant to § 1412(b)(7)(C)(iii), in hich case the State may specify alrnative reporting requirements, as propriate, until filtration is in place.

(1) Source water quality information ust be reported to the State within days after the end of each month e system serves water to the public. formation that must be reported indes:

i) The cumulative number of nths for which results are reported.

ii) The number of fecal and/or total liform samples, whichever are anaed during the month (if a system nitors for both, only fecal coliforms st be reported), the dates of sample lection, and the dates when the turity level exceeded 1 NTU.

iii) The number of samples during month that had equal to or less n 20/100 ml fecal coliforms and/or al to or less than 100/100 ml total iforms, whichever are analyzed.

iv) The cumulative number of fecal total coliform samples, whichever are analyzed, during the previous six months the system served water to the public.

(v) The cumulative number of samples that had equal to or less than 20/100 ml fecal coliforms or equal to or less than 100/100 ml total coliforms, whichever are analyzed, during the previous six months the system served water to the public.

(vi) The percentage of samples that had equal to or less than 20/100 ml fecal coliforms or equal to or less than 100/100 ml total coliforms, whichever are analyzed, during the previous six months the system served water to the public.

(vii) The maximum turbidity level measured during the month, the date(s) of occurrence for any measurement(s) which exceeded 5 NTU, and the date(s) the occurrence(s) was reported to the State.

(viii) For the first 12 months of recordkeeping, the dates and cumulative number of events during which the turbidity exceeded 5 NTU, and after one year of recordkeeping for turbidity measurements, the dates and cumulative number of events during which the turbidity exceeded 5 NTU in the previous 12 months the system served water to the public.

(ix) For the first 120 months of recordkeeping, the dates and cumulative number of events during which the turbidity exceeded 5 NTU, and after 10 years of recordkeeping for turbidity measurements, the dates and cumulative number of events during which the turbidity exceeded 5 NTU in the previous 120 months the system served water to the public.

(2) Disinfection information specified in § 141.74(b) must be reported to the State within 10 days after the end of each month the system serves water to the public. Information that must be reported includes:

(i) For each day, the lowest measurement of residual disinfectant concentration in mg/l in water entering the distribution system.

(ii) The date and duration of each period when the residual disinfectant concentration in water entering the distribution system fell below 0.2 mg/l and when the State was notified of the occurrence.

(iii) The daily residual disinfectant concentration(s) (in mg/l) and disinfectant contact time(s) (in minutes) used for calculating the CT value(s).

(iv) If chlorine is used, the daily measurement(s) of pH of disinfected water following each point of chlorine disinfection.

(v) The daily measurement(s) of water temperature in °C following each point of disinfection.

(vi) The daily CTcalc and CTcalc/$CT_{99.9}$ values for each disinfectant measurement or sequence and the sum of all CTcalc/$CT_{99.9}$ values ((CTcalc/$CT_{99.9}$)) before or at the first customer.

(vii) The daily determination of whether disinfection achieves adequate *Giardia* cyst and virus inactivation, i.e., whether (CTcalc/$CT_{99.9}$) is at least 1.0 or, where disinfectants other than chlorine are used, other indicator conditions that the State determines are appropriate, are met.

(viii) The following information on the samples taken in the distribution system in conjunction with total coliform monitoring pursuant to § 141.72:

(A) Number of instances where the residual disinfectant concentration is measured;

(B) Number of instances where the residual disinfectant concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;

(C) Number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

(D) Number of instances where the residual disinfectant concentration is detected and where HPC is >500/ml;

(E) Number of instances where the residual disinfectant concentration is not measured and HPC is >500/ml;

(F) For the current and previous month the system served water to the public, the value of "V" in the following formula:

$$V = \frac{c+d+e}{a+b} \times 100$$

where

a=the value in paragraph (a)(2)(viii)(A) of this section,
b=the value in paragraph (a)(2)(viii)(B) of this section,
c=the value in paragraph (a)(2)(viii)(C) of this section,
d=the value in paragraph (a)(2)(viii)(D) of this section, and
e=the value in paragraph (a)(2)(viii)(E) of this section.

(G) If the State determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified by § 141.74(a)(3) and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (a)(2)(viii)(A)-(F) of this section do not apply to that system.

(ix) A system need not report the data listed in paragraphs (a)(2)(i), and (iii)-(vi) of this section if all data listed in paragraphs (a)(2) (i)-(viii) of this section remain on file at the system, and the State determines that:

(A) The system has submitted to the State all the information required by paragraphs (a)(2) (i)-(viii) of this section for at least 12 months; and

(B) The State has determined that the system is not required to provide filtration treatment.

(3) No later than ten days after the end of each Federal fiscal year (September 30), each system must provide to the State a report which summarizes its compliance with all watershed control program requirements specified in § 141.71(b)(2).

(4) No later than ten days after the end of each Federal fiscal year (September 30), each system must provide to the State a report on the on-site inspection conducted during that year pursuant to § 141.71(b)(3), unless the on-site inspection was conducted by the State. If the inspection was conducted by the State, the State must provide a copy of its report to the public water system.

(5)(i) Each system, upon discovering that a waterborne disease outbreak potentially attributable to that water system has occurred, must report that occurrence to the State as soon as possible, but no later than by the end of the next business day.

(ii) If at any time the turbidity ex-
eeds 5 NTU, the system must inform
he State as soon as possible, but no
ater than the end of the next busi-
ess day.

(iii) If at any time the residual falls
elow 0.2 mg/l in the water entering
he distribution system, the system
ust notify the State as soon as possi-
le, but no later than by the end of
he next business day. The system also
ust notify the State by the end of
he next business day whether or not
he residual was restored to at least
2 mg/l within 4 hours.

(b) A public water system that uses a
rface water source or a ground water
urce under the direct influence of
rface water and provides filtration
eatment must report monthly to the
ate the information specified in this
ragraph (b) beginning June 29, 1993,
when filtration is installed, which-
er is later.

(1) Turbidity measurements as re-
ired by § 141.74(c)(1) must be re-
rted within 10 days after the end of
ch month the system serves water to
e public. Information that must be
ported includes:

i) The total number of filtered
ter turbidity measurements taken
ring the month.

ii) The number and percentage of
tered water turbidity measurements
ken during the month which are less
an or equal to the turbidity limits
ecified in § 141.73 for the filtration
chnology being used.

iii) The date and value of any tur-
dity measurements taken during the
nth which exceed 5 NTU.

2) Disinfection information speci-
d in § 141.74(c) must be reported to
e State within 10 days after the end
each month the system serves water
the public. Information that must
reported includes:

i) For each day, the lowest measure-
nt of residual disinfectant concen-
tion in mg/l in water entering the
tribution system.

ii) The date and duration of each
riod when the residual disinfectant
ncentration in water entering the
tribution system fell below 0.2 mg/l
d when the State was notified of the
urrence.

(iii) The following information on the samples taken in the distribution system in conjunction with total coliform monitoring pursuant to § 141.72:

(A) Number of instances where the residual disinfectant concentration is measured;

(B) Number of instances where the residual disinfectant concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;

(C) Number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

(D) Number of instances where no residual disinfectant concentration is detected and where HPC is >500/ml;

(E) Number of instances where the residual disinfectant concentration is not measured and HPC is >500/ml;

(F) For the current and previous month the system serves water to the public, the value of "V" in the following formula:

$$V = \frac{c+d+e}{a+b} \times 100$$

where

a = the value in paragraph (b)(2)(iii)(A) of this section,

b = the value in paragraph (b)(2)(iii)(B) of this section,

c = the value in paragraph (b)(2)(iii)(C) of this section,

d = the value in paragraph (b)(2)(iii)(D) of this section, and

e = the value in paragraph (b)(2)(iii)(E) of this section.

(G) If the State determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory within the requisite time and temperature conditions specified by § 141.74(a)(3) and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (b)(2)(iii)(A)-(F) of this section do not apply.

(iv) A system need not report the data listed in paragraph (b)(2)(i) of this section if all data listed in paragraphs (b)(2)(i)-(iii) of this section remain on file at the system and the State determines that the system has submitted all the information required by paragraphs (b)(2)(i)-(iii) of this section for at least 12 months.

(3)(i) Each system, upon discovering that a waterborne disease outbreak potentially attributable to that water system has occurred, must report that occurrence to the State as soon as possible, but no later than by the end of the next business day.

(ii) If at any time the turbidity exceeds 5 NTU, the system must inform the State as soon as possible, but no later than the end of the next business day.

(iii) If at any time the residual falls below 0.2 mg/l in the water entering the distribution system, the system must notify the State as soon as possible, but no later than by the end of the next business day. The system also must notify the State by the end of the next business day whether or not the residual was restored to at least 0.2 mg/l within 4 hours.

Subpart I [Reserved]

Subpart J—Use of Non-Centralized Treatment Devices

Source: 52 FR 25716, July 8, 1987, unless otherwise noted.

§ 141.100 Criteria and procedures for public water systems using point-of-entry devices.

(a) Public water systems may use point-of-entry devices to comply with maximum contaminant levels only if they meet the requirements of this section.

(b) It is the responsibility of the public water system to operate and maintain the point-of-entry treatment system.

(c) The public water system must develop and obtain State approval for a monitoring plan before point-of-entry devices are installed for compliance. Under the plan approved by the State, point-of-entry devices must provide health protection equivalent to central water treatment. "Equivalent" means that the water would meet all national primary drinking water regulations and would be of acceptable quality similar to water distributed by a well-operated central treatment plant. In addition to the VOCs, monitoring must include physical measurements and observations such as total flow treated and mechanical condition of the treatment equipment.

(d) Effective technology must be properly applied under a plan approved by the State and the microbiological safety of the water must be maintained.

(1) The State must require adequate certification of performance, field testing, and, if not included in the certification process, a rigorous engineering design review of the point-of-entry devices.

(2) The design and application of the point-of-entry devices must consider the tendency for increase in heterotrophic bacteria concentrations in water treated with activated carbon. It may be necessary to use frequent backwashing, post-contactor disinfection and Heterotrophic Plate Count monitoring to ensure that the microbiological safety of the water is not compromised.

(e) All consumers shall be protected. Every building connected to the system must have a point-of-entry device installed, maintained, and adequately monitored. The State must be assured that every building is subject to treatment and monitoring, and that the rights and responsibilities of the public water system customer convey with title upon sale of property.

[52 FR 25716, July 8, 1987; 53 FR 25111, July 1, 1988]

§ 141.101 Use of other non-centrali treatment devices.

Public water systems shall not u bottled water or point-of-use devices t achieve compliance with an MCL. Bo tled water or point-of-use devices m be used on a temporary basis to av an unreasonable risk to health.

PART 142—NATIONAL PRIMARY DRINKING WATER REGULATIONS IMPLEMENTATION

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AUTHORITY: 42 U.S.C. 300g, 300g-1, 300g-2, 300g-3, 300g-4, 300g-5, 300g-6, 300j-4, and 300j-9.

SOURCE: 41 FR 2918, Jan. 20, 1976, unless otherwise noted.

Subpart A—General Provisions

§ 142.1 Applicability.

This part sets forth, pursuant to sections 1413 through 1416, 1445, and 1450 of the Public Health Service Act, as amended by the Safe Drinking

Water Act, Pub. L. 93-523, regulations for the implementation and enforcement of the national primary drinking water regulations contained in Part 141 of this chapter.

§ 142.2 Definitions.

As used in this part, and except as otherwise specifically provided:

"Act" means the Public Health Service Act.

"Administrator" means the Administrator of the United States Environmental Protection Agency or his authorized representative.

"Agency" means the United States Environmental Protection Agency.

"Approved State primacy program" consists of those program elements listed in § 142.11(a) that were submitted with the initial State application for primary enforcement authority and approved by the EPA Administrator and all State program revisions thereafter that were approved by the EPA Administrator.

"Contaminant" means any physical, chemical, biological, or radiological substance or matter in water.

"Federal agency" means any department, agency, or instrumentality of the United States.

"Indian Tribe" means any Indian Tribe having a Federally recognized governing body carrying out substantial governmental duties and powers over a defined area.

"Interstate Agency" means an agency of two or more States established by or under an agreement or compact approved by the Congress, or any other agency of two or more States or Indian Tribes having substantial powers or duties pertaining to the control of pollution as determined and approved by the Administrator.

"Maximum contaminant level" means the maximum permissible level of a contaminant in water which is delivered to the free flowing outlet of the ultimate user of a public water system; except in the case of turbidity where the maximum permissible level is measured at the point of entry to the distribution system. Contaminants added to the water under circumstances controlled by the user, except for those resulting from corrosion of piping and plumbing caused by water quality are excluded from this definition.

"Municipality" means a city, town, or other public body created by or pursuant to State law, or an Indian Tribe which does not meet the requirements of Subpart H of this part.

"National primary drinking water regulation" means any primary drinking water regulation contained in Part 141 of this chapter.

"Person" means an individual; corporation; company; association; partnership; municipality; or State, federal, or Tribal agency.

"Primary enforcement responsibility" means the primary responsibility for administration and enforcement of primary drinking water regulations and related requirements applicable to public water systems within a State.

"Public water system" means a system for the provision to the public of piped water for human consumption, if such system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least 60 days out of the year. Such term includes (1) any collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system, and (2) any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system.

"Sanitary survey" means an onsite review of the water source, facilities, equipment, operation and maintenance of a public water system for the purpose of evaluating the adequacy of such source, facilities, equipment, operation and maintenance for producing and distributing safe drinking water.

"State" means one of the States of the United States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, the Trust Territory of the Pacific Islands, or an Indian Tribe treated as a State.

"State primary drinking water regulation" means a drinking water regulation of a State which is comparable to a national primary drinking water regulation.

"State program revision" means a change in an approved State primacy program.

"Supplier of water" means any person who owns or operates a public water system.

"Treatment technique requirement" means a requirement of the national primary drinking water regulations which specifies for a contaminant a specific treatment technique(s) known to the Administrator which leads to a reduction in the level of such contaminant sufficient to comply with the requirements of Part 141 of this chapter.

[41 FR 2918, Jan. 20, 1976, as amended at 53 FR 37410, Sept. 26, 1988; 54 FR 52137, Dec. 20, 1989]

§ 142.3 Scope.

(a) Except where otherwise provided, this part applies to each public water system in each State; except that this part shall not apply to a public water system which meets all of the following conditions:

(1) Which consists only of distribution and storage facilities (and does not have any collection and treatment facilities);

(2) Which obtains all of its water from, but is not owned or operated by, a public water system to which such regulations apply;

(3) Which does not sell water to any person; and

(4) Which is not a carrier which conveys passengers in interstate commerce.

(b) In order to qualify for primary enforcement responsibility, a State's program for enforcement of primary drinking water regulations must apply to all other public water systems in the State, except for:

(1) Public water systems on carriers which convey passengers in interstate commerce;

(2) Public water systems on Indian land with respect to which the State does not have the necessary jurisdiction or its jurisdiction is in question; or

(3) Public water systems owned or maintained by a Federal agency where the Administrator has waived compliance with national primary drinking water regulations pursuant to section 1447(b) of the Act.

(c) Section 1451 of the SDWA authorizes the Administrator to delegate primary enforcement responsibility for public water systems to Indian Tribes. An Indian Tribe must be designated by the Administrator for treatment as a State before it is eligible to apply for Public Water System Supervision grants and primary enforcement responsibility. All primary enforcement responsibility requirements of Parts 141 and 142 apply to Indian Tribes except where specifically noted.

[41 FR 2918, Jan. 20, 1976, as amended at 53 FR 37410, Sept. 26, 1988]

§ 142.4 State and local authority.

Nothing in this part shall diminish any authority of a State or political subdivision to adopt or enforce any law or regulation respecting drinking water regulations or public water systems, but no such law or regulation shall relieve any person of any requirements otherwise applicable under this part.

Subpart B—Primary Enforcement Responsibility

§ 142.10 Requirements for a determination of primary enforcement responsibility.

A State has primary enforcement responsibility for public water systems in the State during any period for which the Administrator determines, based upon a submission made pursuant to § 142.11, and submission under § 142.12, that such State, pursuant to appropriate State legal authority:

(a) Has adopted drinking water regulations which are no less stringent than the national primary drinking water regulations (NPDWRs) in effect under part 141 of this chapter;

(b) Has adopted and is implementing adequate procedures for the enforcement of such State regulations, such procedures to include:

(1) Maintenance of an inventory of public water systems.

(2) A systematic program for conducting sanitary surveys of public water systems in the State, with priority given to sanitary surveys of public water systems not in compliance with State primary drinking water regulations.

(3)(i) The establishment and maintenance of a State program for the certification of laboratories conducting analytical measurements of drinking water contaminants pursuant to the requirements of the State primary drinking water regulations including the designation by the State of a laboratory officer, or officers, certified by the Administrator, as the official(s) responsible for the State's certification program. The requirements of this paragraph may be waived by the Administrator for any State where all analytical measurements required by the State's primary drinking water regulations are conducted at laboratories operated by the State and certified by the Agency. Until such time as the Agency establishes a National quality assurance program for laboratory certification the State shall maintain an interim program for the purpose of approving those laboratories from which the required analytical measurements will be acceptable.

(ii) Upon a showing by an Indian Tribe of an intergovernmental or other agreement to have all analytical tests performed by a certified laboratory, the Administrator may waive this requirement.

(4) Assurance of the availability to the State of laboratory facilitiescertified by the Administrator and capable of performing analytical measurements of all contaminants specified in the State primary drinking water regulations. Until such time as the Agency establishes a National quality assurance program for laboratory certification the Administrator will approve such State laboratories on an interim basis.

(5) The establishment and maintenance of an activity to assure that the design and construction of new or substantially modified public water system facilities will be capable of compliance with the State primary drinking water regulations.

(6) Statutory or regulatory enforcement authority adequate to compel compliance with the State primary drinking water regulations in appropriate cases, such authority to include:

(i) Authority to apply State primary drinking water regulations to all public water systems in the State covered by the national primary drinking water regulations, except for interstate carrier conveyances and systems on Indian land with respect to which the State does not have the necessary jurisdiction or its jurisdiction is in question.

(ii) Authority to sue in courts of competent jurisdiction to enjoin any threatened or continuing violation of the State primary drinking water regulations.

(iii) Right of entry and inspection of public water systems, including the right to take water samples, whether or not the State has evidence that the system is in violation of an applicable legal requirement.

(iv) Authority to require suppliers of water to keep appropriate records and make appropriate reports to the State.

(v) Authority to require public water systems to give public notice that is no less stringent than the EPA requirements in §§ 141.32 and 142.16(a).

(vi) Authority to assess civil or criminal penalties for violation of the State's primary drinking water regulations and public notification requirements, including the authority to assess daily penalties or multiple penalties when a violation continues;

(c) Has established and will maintain record keeping and reporting of its activities under paragraphs (a), (b) and (d) in compliance with §§ 142.14 and 142.15;

(d) If it permits variances or exemptions, or both, from the requirements of the State primary drinking water regulations, it shall do so under conditions and in a manner no less stringent than the requirements under sections 1415 and 1416 of the Act. In granting variances, the State must adopt the Administrator's findings of best available technology, treatment techniques, or other means available as specified in Subpart G of this part. (States with primary enforcement responsibility may adopt procedures different from those set forth in Subparts E and F of this part, which apply to the issuance of variances and exemptions by the Administrator in States that do not have primary enforcement responsibility, provided, that the State procedures meet the requirements of this paragraph); and

(e) Has adopted and can implement an adequate plan for the provision of safe drinking water under emergency circumstances.

(f) An Indian Tribe shall not be required to exercise criminal enforcement jurisdiction to meet the requirements for primary enforcement responsibility.

[41 FR 2918, Jan. 20, 1976, as amended at 43 FR 5373, Feb. 8, 1978; 52 FR 20675, June 2, 1987; 52 FR 41550, Oct. 28, 1987; 53 FR 37410, Sept. 26, 1988; 54 FR 15188, Apr. 17, 1989; 54 FR 52138, Dec. 20, 1989]

§ 142.11 Initial determination of primary enforcement responsibility.

(a) A State may apply to the Administrator for a determination that the State has primary enforcement responsibility for public water systems in the State pursuant to section 1413 of the Act. The application shall be as concise as possible and include a side-by-side comparison of the Federal requirements and the corresponding State authorities, including citations to the specific statutes and administrative regulations or ordinances and, wherever appropriate, judicial decisions which demonstrate adequate authority to meet the requirements of § 142.10. The following information is to be included with the State application.

(1) The text of the State's primary drinking water regulations, with references to those State regulations that vary from comparable regulations set forth in Part 141 of this chapter, and a demonstration that any different State regulation is at least as stringent as the comparable regulation contained in Part 141.

(2) A description, accompanied by appropriate documentation, of the State's procedures for the enforcement of the State primary drinking water regulations. The submission shall include:

(i) A brief description of the State's program to maintain a current inventory of public water systems.

(ii) A brief description of the State's program for conducting sanitary surveys, including an explanation of the priorities given to various classes of public water systems.

(iii) A brief description of the State's laboratory approval or certification program, including the name(s) of the responsible State laboratory officer(s) certified by the Administrator.

(iv) Identification of laboratory facilities, available to the State, certified or approved by the Administrator and capable of performing analytical measurements of all contaminants specified in the State's primary drinking water regulations.

(v) A brief description of the State's program activity to assure that the design and construction of new or substantially modified public water system facilities will be capable of compliance with the requirements of the State primary drinking water regulations.

(vi) Copies of State statutory and regulatory provisions authorizing the adoption and enforcement of State primary drinking water regulations, and a brief description of State procedures for administrative or judicial action with respect to public water systems not in compliance with such regulations.

(3) A statement that the State will make such reports and will keep such records as may be required pursuant to §§ 142.14 and 142.15.

(4) If the State permits variances or exemptions from its primary drinking water regulations, the text of the State's statutory and regulatory provisions concerning variances and exemptions.

(5) A brief description of the State's plan for the provision of safe drinking water under emergency conditions. NOTE: In satisfaction of this requirement, for public water supplies from groundwater sources, EPA will accept the contingency plan for providing alternate drinking water supplies that is part of a State's Wellhead Protection Program, where such program has been approved by EPA pursuant to section 1428 of the SDWA.

(6)(i) A statement by the State Attorney General (or the attorney for the State primacy agency if it has independent legal counsel) or the attorney representing the Indian tribe that certifies that the laws and regulations adopted by the State or tribal ordinances to carry out the program were duly adopted and are enforceable. State statutes and regulations cited by the State Attorney General and tribal ordinances cited by the attorney representing the Indian tribe shall be in the form of lawfully adopted State statutes and regulations or tribal ordinances at the time the certification is made and shall be fully effective by the time the program is approved by EPA. To qualify as "independent legal counsel," the attorney signing the statement required by this section shall have full authority to independently represent the State primacy agency or Indian tribe in court on all matters pertaining to the State or tribal program.

(ii) After EPA has received the documents required under paragraph (a) of this section, EPA may selectively require supplemental statements by the State Attorney General (or the attorney for the State primacy agency if it has independent legal counsel) or the attorney representing the Indian tribe. Each supplemental statement shall address all issues concerning the adequacy of State authorities to meet the requirements of § 142.10 that have been identified by EPA after thorough examination as unresolved by the documents submitted under paragraph (a) of this section.

(b) (1) The administrator shall act on an application submitted pursuant to § 142.11 within 90 days after receiving such application, and shall promptly inform the State in writing of this action. If he denies the application, his written notification to the State shall include a statement of reasons for the denial.

(2) A determination by the Administrator that a State has met the requirements for primary enforcement responsibility shall take effect in accordance with § 142.13.

(3) When the Administrator's determination becomes effective pursuant to § 142.13, it shall continue in effect unless terminated pursuant to § 142.17.

[41 FR 2918, Jan. 20, 1976, as amended at 54 FR 52138, Dec. 20, 1989]

§ 142.12 Revision of State programs.

(a) *General requirements.* Either EPA or the primacy State may initiate actions that require the State to revise its approved State primacy program. To retain primary enforcement responsibility, States must adopt all new and revised national primary drinking water regulations promulgated in part 141 of this chapter and any other requirements specified in this part.

(1) Whenever a State revises its approved primacy program to adopt new or revised Federal regulations, the State must submit a request to the Administrator for approval of the program revision, using the procedures described in paragraphs (b), (c), and (d) of this section. The Administrator shall approve or disapprove each State request for approval of a program revision based on the requirements of the Safe Drinking Water Act and of this part.

(2) For all State program revisions not covered under § 142.12(a)(1), the review procedures outlined in § 142.17(a) shall apply.

(b) *Timing of State requests for approval of program revisions to adopt new or revised Federal regulations.* (1) Complete and final State requests for approval of program revisions to adopt new or revised EPA regulations must be submitted to the Administrator within 18 months after promulgation of the new or revised EPA regulations, unless the State requests an extension and the Administrator has approved the request pursuant to paragraph (b)(2) of this section. If the State expects to submit a final State request for approval of a program revision to EPA more than 18 months after promulgation of the new or revised EPA regulations, the State shall request an extension of the deadline before the expiration of the 18-month period.

(2) The final date for submission of a complete and final State request for a program revision may be extended by EPA for up to a two-year period upon a written application by the State to the Administrator. In the extension application the State must demonstrate it is requesting the extension because it cannot meet the original deadline for reasons beyond its control despite a good faith effort to do so. The application must include a schedule for the submission of a final request by a certain time and provide

sufficient information to demonstrate that the State:

(i)(A) Currently lacks the legislative or regulatory authority to enforce the new or revised requirements, or

(B) Currently lacks the program capability adequate to implement the new or revised requirements; or

(C) Is requesting the extension to group two or more program revisions in a single legislative or regulatory action; and

(ii) Is implementing the EPA requirements to be adopted by the State in its program revision pursuant to paragraph (b)(3) of this section within the scope of its current authority and capabilities.

(3) To be granted an extension, the State must agree with EPA to meet certain requirements during the extension period, which may include the following types of activities as determined appropriate by the Administrator on a case-by-case basis:

(i) Informing public water systems of the new EPA (and upcoming State) requirements and that EPA will be overseeing implementation of the requirements until EPA approves the State program revision;

(ii) Collecting, storing and managing laboratory results, public notices, and other compliance and operation data required by the EPA regulations;

(iii) Assisting EPA in the development of the technical aspects of enforcement actions and conducting informal follow-up on violations (telephone calls, letters, etc.);

(iv) Providing technical assistance to public water systems;

(v) Providing EPA with all information prescribed by § 142.15 of this part on State reporting; and

(vi) For States whose request for an extension is based on a current lack of program capability adequate to implement the new requirements, taking steps agreed to by EPA and the State during the extension period to remedy the deficiency.

(c) *Contents of a State request for approval of a program revision.* (1) The State request for EPA approval of a program revision shall be concise and must include:

(i) The documentation necessary (pursuant to § 142.11(a)) to update the approved State primacy program, and identification of those elements of the approved State primacy program that have not changed because of the program revision. The documentation shall include a side-by-side comparison of the Federal requirements and the corresponding State authorities, including citations to the specific statutes and administrative regulations or ordinances and, wherever appropriate, judicial decisions which demonstrate adequate authority to meet the requirements of § 142.10 as they apply to the program revision.

(ii) Any additional materials that are listed in § 142.16 of this part for a specific EPA regulation, as appropriate; and

(iii) For a complete and final State request only, unless one of the conditions listed in paragraph (c)(2) of this section are met, a statement by the State Attorney General (or the attorney for the State primacy agency if it has independent legal counsel) or the attorney representing the Indian tribe that certifies that the laws and regulations adopted by the State or tribal ordinances to carry out the program revision were duly adopted and are enforceable. State statutes and regulations cited by the State Attorney General and tribal ordinances cited by the attorney for the Indian tribe shall be in the form of lawfully adopted State statutes and regulations or tribal ordinances at the time the certification is made and shall be fully effective by the time the request for program revision is approved by EPA. To qualify as "independent legal counsel," the attorney signing the statement required by this section shall have full authority to independently represent the State primacy agency or tribe in court on all matters pertaining to the State or tribal program.

(2) An Attorney General's statement will be required as part of the State request for EPA approval of a program revision unless EPA specifically waives this requirement for a specific regulation at the time EPA promulgates the regulation, or by later written notice from the Administrator to the State.

(3) After EPA has received the documents required under paragraph (c)(1) of this section, EPA may selectively re-

quire supplemental statements by the State Attorney General (or the attorney for the State primacy agency if it has independent legal counsel) or the attorney representing the Indian tribe. Each supplemental statement shall address all issues concerning the adequacy of State authorities to meet the requirements of § 142.10 that have been identified by EPA after thorough examination as unresolved by the documents submitted under paragraph (c)(1) of this section.

(d) *Procedures for review of a State request for approval of a program revision.*—(1) *Preliminary request.* (i) The State may submit to the Administrator for his or her review a preliminary request for approval of each program revision, containing the information listed in paragraph (c)(1) of this section, *in draft form.* The preliminary request does not require an Attorney General's statement in draft form, but does require draft State statutory or regulatory changes and a side-by-side comparison of State authorities with EPA requirements to demonstrate that the State program revision meets EPA requirements under § 142.10 of this part. The preliminary request should be submitted to the Administrator as soon as practicable after the promulgation of the EPA regulations.

(ii) The Administrator will review the preliminary request submitted in accordance with paragraph (d)(1)(i) of this section and make a tentative determination on the request. The Administrator will send the tentative determination and other comments or suggestions to the State for its use in developing the State's final request under paragraph (d)(2) of this section.

(2) *Final request.* The State must submit a complete and final request for approval of a program revision to the Administrator for his or her review and approval. The request must contain the information listed in paragraph (c)(1) of this section *in complete and final form,* in accordance with any tentative determination EPA may have issued. Complete and final State requests for program revisions shall be submitted within 18 months of the promulgation of the new or revised EPA regulations, as specified in paragraph (b) of this section.

(3) *EPA's determination on a complete and final request.* (i) The Administrator shall act on a State's request for approval of a program revision within 90 days after determining that the State request is complete and final and shall promptly notify the State of his/her determination.

(ii) If the Administrator disapproves a final request for approval of a program revision, the Administrator will notify the State in writing. Such notification will include a statement of the reasons for disapproval.

(iii) A final determination by the Administrator on a State's request for approval of a program revision shall take effect in accordance with the public notice requirements and related procedures under § 142.13.

[54 FR 52138, Dec. 20, 1989]

§ 142.13 Public hearing.

(a) The Administrator shall provide an opportunity for a public hearing before a determination pursuant to § 142.11 that the State meets or does not meet the requirements for obtaining primary enforcement responsibility, or a determination pursuant to § 142.12(d)(3) to approve or disapprove a State request for approval of a program revision, or a determination pursuant to § 142.17 that a State no longer meets the requirements for primary enforcement responsibility.

(b) The Administrator shall publish notice of any determination specified in paragraph (a) of this section in the FEDERAL REGISTER and in a newspaper or newspapers of general circulation in the State involved within 15 days after making such determination, with a statement of his reasons for the determination. Such notice shall inform interested persons that they may request a public hearing on the Administrator's determination. Such notice shall also indicate one or more locations in the State where information submitted by the State pursuant to § 142.11 is available for inspection by the general public. A public hearing may be requested by any interested person other than a Federal agency. Frivolous or insubstantial requests for hearing may be denied by the Administrator.

(c) Requests for hearing submitted pursuant to paragraph (b) of this section shall be submitted to the Administrator within 30 days after publication of notice of opportunity for hearing in the FEDERAL REGISTER. Such requests shall include the following information:

(1) The name, address and telephone number of the individual, organization or other entity requesting a hearing.

(2) A brief statement of the requesting person's interest in the Administrator's determination and of information that the requesting person intends to submit at such hearing.

(3) The signature of the individual making the request; or, if the request is made on behalf of an organization or other entity, the signature of a responsible official of the organization or other entity.

(d) The Administrator shall give notice in the FEDERAL REGISTER and in a newspaper or newspapers of general circulation in the State involved of any hearing to be held pursuant to a request submitted by an interested person or on his own motion. Notice of the hearing shall also be sent to the person requesting a hearing, if any, and to the State involved. Notice of the hearing shall include a statement of the purpose of the hearing, information regarding the time and location or locations for the hearing and the address and telephone number of an office at which interested persons may obtain further information concerning the hearing. At least one hearing location specified in the public notice shall be within the involved State. Notice of hearing shall be given not less than 15 days prior to the time scheduled for the hearing.

(e) Hearings convened pursuant to paragraph (d) of this section shall be conducted before a hearing officer to be designated by the Administrator. The hearing shall be conducted by the hearing officer in an informal, orderly and expeditious manner. The hearing officer shall have authority to call witnesses, receive oral and written testimony and take such other action as may be necessary to assure the fair and efficient conduct of the hearing. Following the conclusion of the hearing, the hearing officer shall forward the record of the hearing to the Administrator.

(f) After reviewing the record of the hearing, the Administrator shall issue an order affirming the determination referred to in paragraph (a) of this section or rescinding such determination. If the determination is affirmed, it shall become effective as of the date of the Administrator's order.

(g) If no timely request for hearing is received and the Administrator does not determine to hold a hearing on his own motion, the Administrator's determination shall become effective 30 days after notice is issued pursuant to paragraph (b) of this section.

(h) If a determination of the Administrator that a State no longer meets the requirements for primary enforcement responsibility becomes effective, the State may subsequently apply for a determination that it meets such requirements by submitting to the Administrator information demonstrating that it has remedied the deficiencies found by the Administrator without adversely sacrificing other aspects of its program required for primary enforcement responsibility.

[41 FR 2918, Jan. 20, 1976, as amended at 54 FR 52140, Dec. 20, 1989]

§ 142.14 Records kept by States.

(a) Each State which has primary enforcement responsibility shall maintain records of tests, measurements, analyses, decisions, and determinations performed on each public water system to determine compliance with applicable provisions of State primary drinking water regulations.

(1) Records of microbiological analyses shall be retained for not less than 1 year. Actual laboratory reports may be kept or data may be transferred to tabular summaries, provided that the information retained includes:

(i) The analytical method used;

(ii) The number of samples analyzed each month;

(iii) The analytical results, set forth in a form which makes possible comparison with the limits specified in §§ 141.63, 141.71, and 141.72 of this chapter.

(2) Records of microbiological analyses of repeat or special samples shall

be retained for not less than one year in the form of actual laboratory reports or in an appropriate summary form.

(3) Records of turbidity measurements shall be kept for not less than one year. The information retained must be set forth in a form which makes possible comparison with the limits specified in §§ 141.71 and 141.73 of this chapter. Until June 29, 1993, for any public water system which is providing filtration treatment and until December 30, 1991, for any public water system not providing filtration treatment and not required by the State to provide filtration treatment, records kept must be set forth in a form which makes possible comparison with the limits contained in § 141.13.

(i) Date and place of sampling.

(ii) Date and results of analyses.

(4)(i) Records of disinfectant residual measurements and other parameters necessary to document disinfection effectiveness in accordance with §§ 141.72 and 141.74 of this chapter and the reporting requirements of § 141.75 of this chapter shall be kept for not less than one year.

(ii) Records of decisions made on a system-by-system and case-by-case basis under provisions of Part 141, Subpart H, shall be made in writing and kept at the State.

(A) Records of decisions made under the following provisions shall be kept for 40 years (or until one year after the decision is reversed or revised) and a copy of the decision must be provided to the system:

(*1*) Section 141.73(a)(1)—Any decision to allow a public water system using conventional filtration treatment or direct filtration to substitute a turbidity limit greater than 0.5 NTU;

(*2*) Section 141.73(b)(1)—Any decision to allow a public water system using slow sand filtration to substitute a turbidity limit greater than 1 NTU;

(*3*) Section 141.74(b)(2)—Any decision to allow an unfiltered public water system to use continuous turbidity monitoring;

(*4*) Section 141.74(b)(6)(i)—Any decision to allow an unfiltered public water system to sample residual disinfectant concentration at alternate locations if it also has ground water source(s);

(*5*) Section 141.74(c)(1)—Any decision to allow a public water system using filtration treatment to use continuous turbidity monitoring; or a public water system using slow sand filtration or filtration treatment other than conventional treatment, direct filtration or diatomaceous earth filtration to reduce turbidity sampling to once per day; or for systems serving 500 people or fewer to reduce turbidity sampling to once per day;

(*6*) Section 141.74(c)(3)(i)—Any decision to allow a filtered public water system to sample disinfectant residual concentration at alternate locations if it also has ground water source(s);

(*7*) Section 141.75(a)(2)(ix)—Any decision to allow reduced reporting by an unfiltered public water system; and

(*8*) Section 141.75(b)(2)(iv)—Any decision to allow reduced reporting by a filtered public water system.

(B) Records of decisions made under the following provisions shall be kept for one year after the decision is made:

(*1*) Section 141.71(b)(1)(i)—Any decision that a violation of monthly CT compliance requirements was caused by circumstances that were unusual and unpredictable.

(*2*) Section 141.71(b)(1)(iv)—Any decision that a violation of the disinfection effectiveness criteria was not caused by a deficiency in treatment of the source water;

(*3*) Section 141.71(b)(5)—Any decision that a violation of the total coliform MCL was not caused by a deficiency in treatment of the source water;

(*4*) Section 141.74(b)(1)—Any decision that total coliform monitoring otherwise required because the turbidity of the source water exceeds 1 NTU is not feasible, except that if such decision allows a system to avoid monitoring without receiving State approval in each instance, records of the decision shall be kept until one year after the decision is rescinded or revised.

(C) Records of decisions made under the following provisions shall be kept for the specified period or 40 years, whichever is less.

(*1*) Section 141.71(a)(2)(i)—Any decision that an event in which the source water turbidity which exceeded 5 NTU for an unfiltered public water system was unusual and unpredictable shall be kept for 10 years.

(*2*) Section 141.71(b)(1)(iii)—Any decision by the State that failure to meet the disinfectant residual concentration requirements of § 141.72(a)(3)(i) was caused by circumstances that were unusual and unpredictable, shall be kept unless filtration is installed. A copy of the decision must be provided to the system.

(*3*) Section 141.71(b)(2)—Any decision that a public water system's watershed control program meets the requirements of this section shall be kept until the next decision is available and filed.

(*4*) Section 141.70(c)—Any decision that an individual is a qualified operator for a public water system using a surface water source or a ground water source under the direct influence of surface water shall be maintained until the qualification is withdrawn. The State may keep this information in the form of a list which is updated periodically. If such qualified operators are classified by category, the decision shall include that classification.

(*5*) Section 141.71(b)(3)—Any decision that a party other than the State is approved by the State to conduct on-site inspections shall be maintained until withdrawn. The State may keep this information in the form of a list which is updated periodically.

(*6*) Section 141.71(b)(4)—Any decision that an unfiltered public water system has been identified as the source of a waterborne disease outbreak, and, if applicable, that it has been modified sufficiently to prevent another such occurrence shall be kept until filtration treatment is installed. A copy of the decision must be provided to the system.

(*7*) Section 141.72—Any decision that certain interim disinfection requirements are necessary for an unfiltered public water system for which the State has determined that filtration is necessary, and a list of those requirements, shall be kept until filtration treatment is installed. A copy of the requirements must be provided to the system.

(*8*) Section 141.72(a)(2)(ii)—Any decision that automatic shut-off of delivery of water to the distribution system of an unfiltered public water system would cause an unreasonable risk to health or interfere with fire protection shall be kept until rescinded.

(*9*) Section 141.72(a)(4)(ii)—Any decision by the State, based on site-specific considerations, that an unfiltered system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified by § 141.74(a)(3) and that the system is providing adequate disinfection in the distribution system, so that the disinfection requirements contained in § 141.72(a)(4)(i) do not apply, and the basis for the decision, shall be kept until the decision is reversed or revised. A copy of the decision must be provided to the system.

(*10*) Section 141.72(b)(3)(ii)—Any decision by the State, based on site-specific conditions, that a filtered system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified by § 141.74(a)(3) and that the system is providing adequate disinfection in the distribution system, so that the disinfection requirements contained in § 141.72(b)(3)(i) do not apply, and the basis for the decision, shall be kept until the decision is reversed or revised. A copy of the decision must be provided to the system.

(*11*) Section 141.73(d)—Any decision that a public water system, having demonstrated to the State that an alternative filtration technology, in combination with disinfection treatment, consistently achieves 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts and 99.99 percent removal and/or inactivation of viruses, may use such alternative filtration technology, shall be kept until the decision is reversed or revised. A copy of the decision must be provided to the system.

(*12*) Section 141.74(b), Table 3.1—Any decision that a system using either preformed chloramines or chloramines formed by the addition of ammonia prior to the addition of chlorine has demonstrated that 99.99 percent removal —nd/or inactivation of viruses has been achieved at particular CT values, and a list of those values, shall be kept until the decision is reversed or revised. A copy of the list of required values must be provided to the system.

(*13*) Section 141.74(b)(3)(v)—Any decision that a system using a disinfectant other than chlorine may use $CT_{99.9}$ values other than those in Tables 2.1 or 3.1 and/or other operational parameters to determine if the minimum total inactivation rates required by § 141.72(a)(1) are being met, and what those values or parameters are, shall be kept until the decision is reversed or revised. A copy of the list of required values or parameters must be provided to the system.

(*14*) Section 142.16(b)(2)(i)(B)—Any decision that a system using a ground water source is under the direct influence of surface water.

(iii) Records of any determination that a public water system supplied by a surface water source or a ground water source under the direct influence of surface water is not required to provide filtration treatment shall be kept for 40 years or until withdrawn, whichever is earlier. A copy of the determination must be provided to the system.

(5) Records of each of the following decisions made pursuant to the total coliform provisions of Part 141 shall be made in writing and retained by the State.

(i) Records of the following decisions must be retained for 5 years.

(A) Section 141.21(b)(1)—Any decision to waive the 24-hour time limit for collecting repeat samples after a total coliform-positive routine sample if the public water system has a logistical problem in collecting the repeat sample that is beyond the system's control, and what alternative time limit the system must meet.

(B) Section 141.21(b)(5)—Any decision to allow a system to waive the requirement for five routine samples the month following a total coliform-positive sample. If the waiver decision is made as provided in § 141.21(b)(5), the record of the decision must contain all the items listed in that paragraph.

(C) Section 141.21(c)—Any decision to invalidate a total coliform-positive sample. If the decision to invalidate a total coliform-positive sample as provided in § 141.21(c)(1)(iii) is made, the record of the decision must contain all the items listed in that paragraph.

(ii) Records of each of the following decisions must be retained in such a manner so that each system's current status may be determined.

(A) Section 141.21(a)(2)—Any decision to reduce the total coliform monitoring frequency for a community water system serving 1,000 persons or fewer, that has no history of total coliform contamination in its current configuration and had a sanitary survey conducted within the past five years showing that the system is supplied solely by a protected groundwater source and is free of sanitary defects, to less than once per month, as provided in § 141.21(a)(2); and what the reduced monitoring frequency is. A copy of the reduced monitoring frequency must be provided to the system.

(B) Section 141.21(a)(3)(i)—Any decision to reduce the total coliform monitoring frequency for a non-community water system using only ground water and serving 1,000 persons or fewer to less than once per quarter, as provided in § 141.21(a)(3)(i), and what the reduced monitoring frequency is. A copy of the reduced monitoring frequency must be provided to the system.

(C) Section 141.21(a)(3)(ii)—Any decision to reduce the total coliform monitoring frequency for a non-community water system using only ground water and serving more than 1,000 persons during any month the system serves 1,000 persons or fewer, as provided in § 141.21(a)(3)(ii). A copy of the reduced monitoring frequency must be provided to the system.

(D) Section 141.21(a)(5)—Any decision to waive the 24-hour limit for taking a total coliform sample for a public water system which uses surface water, or ground water under the direct influence of surface water, and which does not practice filtration in accordance with Part 141, Subpart H, and which measures a source water turbidity level exceeding 1 NTU near the first service connection as provided in § 141.21(a)(5).

(E) Section 141.21(d)(1)—Any decision that a non-community water system is using only protected and disinfected ground water and therefore may reduce the frequency of its sanitary survey to less than once every five years, as provided in § 141.21(d), and what that frequency is. A copy of the reduced frequency must be provided to the system.

(F) Section 141.21(d)(2)—A list of agents other than the State, if any, approved by the State to conduct sanitary surveys.

(G) Section 141.21(e)(2)—Any decision to allow a public water system to forgo fecal coliform or *E. coli* testing on a total coliform-positive sample if that system assumes that the total coliform-positive sample is fecal coliform-positive or *E. coli*-positive, as provided in § 141.21(e)(2).

(6) Records of analyses for contaminants other than microbiological contaminants (including total coliform, fecal coliform, and heterotrophic plate count), residual disinfectant concentration, other parameters necessary to determine disinfection effectiveness (including temperature and pH measurements), and turbidity, must be retained for not less than 40 years and shall include at least the following information:

(i) Date and place of sampling.

(ii) Date and results of analyses.

(b) Records required to be kept pursuant to paragraph (a) of this section must be in a form admissible as evidence in State enforcement proceedings.

(c) Each State which has primary enforcement responsibility shall maintain current inventory information for each public water system in the State and shall retain inventory records of public water systems for not less than 40 years. Records retained by a State pursuant to this paragraph for at least 10 years may be transferred to the Agency to satisfy the remainder of the 40 year retention period.

(d) Each State which has primary enforcement responsibility shall retain, for not less than 10 years, files which shall include for each such public water system in the State:

(1) Reports of sanitary surveys;

(2) Records of any State approvals;

(3) Records of any enforcement actions.

(e) Each State which has primary enforcement responsibility shall retain records pertaining to each variance and exemption granted by it for a period of not less than 5 years following the expiration of such variance or exemption.

(f) The records required to be kept by this section shall be maintained and made available for public inspection by the State, or, the State at its option may require suppliers of water to make available for public inspection those records maintained in accordance with § 141.33.

[41 FR 2918, Jan. 20, 1976, as amended at 54 FR 27537, June 29, 1989; 55 FR 25065, June 19, 1990]

Effective Date Note: At 54 FR 27537, June 29, 1989, § 142.14 was amended by revising paragraph (a) introductory text, (a)(1)(iii), (a)(3) introductory text, (a)(4) and redesignating it as paragraph (a)(6), by adding new paragraph (a)(4), and by adding and reserving paragraph (a)(5), effective December 31, 1990. For the convenience of the user, the superseded text reads as follows:

§ 142.14 Records kept by States.

(a) Each State which has primary enforcement responsibility shall maintain records of tests, measurements and analyses performed on each public water system to determine compliance with applicable provisions of State primary drinking water regulations.

(1) * * *

(iii) The analytical results, set forth in a form which makes possible comparison with the limits specified in § 141.14 of this chapter.

* * * * *

(3) Records of turbidity measurements shall be retained for not less than 1 year and shall include at least the following information:

* * * * *

(4) Records of analyses for other than microbiological contaminants or turbidity shall be retained for not less than 40 years and shall include at least the following information:

(i) Date and place of sampling.

(ii) Date and results of analyses.

Records retained by a State pursuant to this paragraph for at least 10 years, may be transferred to the Agency to satisfy the remainder of the required 40 year retention period.

* * * * *

EFFECTIVE DATE NOTE: At 54 FR 27567, June 29, 1989, § 142.14 was amended by revising paragraph (a)(2) and adding a new paragraph (a)(5), effective December 31, 1990. For the convenience of the user, the superseded text follows.

§ 142.14 Records kept by States.

(a) * * *

(2) Records of microbiological analyses of check or special samples shall be retained for not less than 1 year in the form of actual laboratory reports or in an appropriate summary form.

* * * * *

§ 142.15 Reports by States.

Each State which has primary enforcement responsibility shall submit to the Administrator the following information:

(a) Each State which has primary enforcement responsibility shall submit quarterly reports to the Administrator on a schedule and in a format prescribed by the Administrator, consisting of the following information:

(1) New violations by public water systems in the State during the previous quarter of State regulations adopted to incorporate the requirements of national primary drinking water regulations;

(2) New enforcement actions taken by the State during the previous quarter against public water systems with respect to State regulations adopted to incorporate the requirements of national primary drinking water regulations;

(3) Notification of any new variance or exemption granted during the previous quarter. The notice shall include a statement of reasons for the granting of the variance or exemption, including documentation of the need for the variance or exemption and the finding that the granting of the variance or exemption will not result in an unreasonable risk to health. The State may use a single notification statement to report two or more similar variances or exemptions.

(b) Each State which has primary enforcement responsibility shall submit annual reports to the Administrator on a schedule and in a format prescribed by the Administrator, consisting of the following information:

(1) All additions or corrections to the State's inventory of public water systems;

(2) A summary of the status of each variance and exemption currently in effect.

(c) *Special Reports.* (1) *Surface Water Treatment Rule.* (i)(A) A list identifying the name, PWS identification number and date of the determination for each public water system supplied by a surface water source or a ground water source under the direct influence of surface water, which the State has determined is not required to provide filtration treatment.

(B) A list identifying the name and PWS identification number of each public water system supplied by a surface water source or ground water source under the direct influence of surface water, which the State has determined, based on an evaluation of site-specific considerations, has no means of having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified in § 141.74(a)(3) and is providing adequate disinfection in the distribution system, regardless of whether the system is in compliance with the criteria of § 141.72(a)(4)(i) or (b)(3)(i) of this chapter, as allowed by § 141.72(a)(4)(ii) and (b)(3)(ii). The list must include the effective date of each determination.

(ii) Notification within 60 days of the end of the calendar quarter of any determination that a public water system using a surface water source or a ground water source under the direct influence of surface water is not required to provide filtration treatment. The notification must include a statement describing the system's compliance with each requirement of the State's regulations that implement § 141.71 and a summary of comments, if any, received from the public on the determination. A single notification may be used to report two or more such determinations.

(2) *Total Coliforms.* A list of public water systems which the State is allowing to monitor less frequently than once per month for community water systems or less frequently than once per quarter for non-community water systems as provided in § 141.21(a), including the effective date of the reduced monitoring requirement for each system.

(d) The reports submitted pursuant to this section shall be made available by the State to the public for inspection at one or more locations within the State.

[41 FR 2918, Jan. 20, 1976, as amended at 43 FR 5373, Feb. 8, 1978; 54 FR 27539, June 29, 1989; 55 FR 52140, Dec. 20, 1989; 55 FR 25065, June 19, 1990]

EFFECTIVE DATE NOTE: At 54 FR 27539, June 29, 1989, § 142.15 was amended by adding paragraphs (b)(3) and (4) and paragraph (e), effective December 31, 1990. At 54 FR 52140, Dec. 20, 1989, § 142.15 was further amended by redesignating paragraphs (b)(3) and (4) as paragraphs (c)(1)(i)(A) and (B), and by redesignating paragraph (e) as paragraph (c)(1)(ii), effective January 19, 1990.

§ 142.16 Special primacy requirements.

(a) *State public notification requirements.* If a State exercises the option specified in § 141.32(b)(4) to authorize less frequent notice for minor monitoring violations, it must adopt a program revision enforceable under State authorities which promulgates rules specifying either: (1) Which monitoring violations are minor and the frequency of public notification for such violations; or (2) criteria for determining which monitoring violations are minor and the frequency of public notification.

(b) *Requirements for States to adopt 40 CFR Part 141, Subpart H Filtration and Disinfection.* In addition to the general primacy requirements enumerated elsewhere in this part, including the requirement that State provisions are no less stringent than the federal requirements, an application for approval of a State program revision that adopts 40 CFR Part 141, Subpart H Filtration and Disinfection, must contain the information specified in this paragraph (b), except that States which require without exception all public water systems using a surface water source or a ground water source under the direct influence of surface water to provide filtration need not demonstrate that the State program has provisions that apply to systems which do not provide filtration treatment. However, such States must provide the text of the State statutes or regulations which specifies that all public water systems using a surface water source or a ground water source under the direct influence of surface water must provide filtration.

(1) *Enforceable requirements.* In addition to adopting criteria no less stringent than those specified in Part 141, Subpart H of this chapter, the State's application must include enforceable design and operating criteria for each filtration treatment technology allowed or a procedure for establishing design and operating conditions on a system-by-system basis (e.g., a permit system).

(2) *State practices or procedures.* (i) A State application for program revision approval must include a description of how the State will accomplish the following:

(A) Section 141.70(c) (qualification of operators)—Qualify operators of systems using a surface water source or a ground water source under the direct influence of surface water.

(B) Determine which systems using a ground water source are under the direct influence of surface water by June 29, 1994 for community water systems and by June 29, 1999 for non-community water systems.

(C) Section 141.72(b)(1) (achieving required *Giardia lamblia* and virus removal in filtered systems)—Determine that the combined treatment process incorporating disinfection treatment and filtration treatment will achieve the required removal and/or inactivation of *Giardia lamblia* and viruses.

(D) Section 141.74(a) (State approval of parties to conduct analyses)—approve parties to conduct pH, temperature, turbidity, and residual disinfectant concentration measurements.

(E) Determine appropriate filtration treatment technology for source waters of various qualities.

(ii) For a State which does not require all public water systems using a surface water source or ground water source under the direct influence of surface water to provide filtration treatment, a State application for program revision approval must include a description of how the State will accomplish the following:

(A) Section 141.71(b)(2) (watershed control program)—Judge the adequacy of watershed control programs.

(B) Section 141.71(b)(3) (approval of on-site inspectors)—Approve on-site inspectors other than State personnel and evaluate the results of on-site inspections.

(iii) For a State which adopts any of the following discretionary elements of Part 141 of this chapter, the application must describe how the State will:

(A) Section 141.72 (interim disinfection requirements)—Determine interim disinfection requirements for unfiltered systems which the State has determined must filter which will be in effect until filtration is installed.

(B) Section 141.72(a)(4)(ii) and (b)(3)(ii) (determination of adequate disinfection in system without disinfectant residual)—Determine that a system is unable to measure HPC but is still providing adequate disinfection in the distribution system, as allowed by § 141.72(a)(4)(ii) for systems which do not provide filtration treatment and § 141.72(b)(3)(ii) for systems which do provide filtration treatment.

(C) Section 141.73(a)(1) and (b)(1) (alternative turbidity limit)—Determine whether an alternative turbidity limit is appropriate and what the level should be as allowed by § 141.73(a)(1) for a system using conventional filtration treatment or direct filtration and by § 141.73(b)(1) for a system using slow sand filtration.

(D) Section 141.73(d) (alternative filtration technologies)—Determine that a public water system has demonstrated that an alternate filtration technology, in combination with disinfection treatment, achieves adequate removal and/or disinfection of *Giardia lamblia* and viruses.

(E) Section 141.74(a)(5) (alternate analytical method for chlorine)—Approve DPD colorimetric test kits for free and combined chlorine measurement or approve calibration of automated methods by the Indigo Method for ozone determination.

(F) Section 141.74 (b)(2) and (c)(1) (approval of continuous turbidity monitoring)—Approve continuous turbidity monitoring, as allowed by § 141.74(b)(2) for a public water system which does not provide filtration treatment and § 141.74(c)(1) for a system which does provide filtration treatment.

(G) Section 141.74 (b)(6)(i) and (c)(3)(i) (approval of alternate disinfectant residual concentration sampling plans)—Approve alternate disinfectant residual concentration sampling plans for systems which have a combined ground water and surface water or ground water and ground water under the direct influence of a surface water distribution system, as allowed by § 141.74(b)(6)(i) for a public water system which does not provide filtration treatment and § 141.74(c)(3)(i) for a public water system which does provide filtration treatment.

(H) Section 141.74(c)(1) (reduction of turbidity monitoring)—Decide whether to allow reduction of turbidity monitoring for systems using slow sand filtration, an approved alternate filtration technology or serving 500 people or fewer.

(I) Section 141.75 (a)(2)(ix) and (b)(2)(iv) (reduced reporting)—Determine whether reduced reporting is appropriate, as allowed by § 141.75(a)(2)(ix) for a public water system which does not provide filtration treatment and § 141.75(b)(2)(iv) for a public water system which does provide filtration treatment.

(iv) For a State which does not require all public water systems using a surface water source or ground water source under the direct influence of surface water to provide filtration treatment and which uses any of the following discretionary provisions, the application must describe how the State will:

(A) Section 141.71(a)(2)(i) (source water turbidity requirements)—Determine that an exceedance of turbidity limits in source water was caused by circumstances that were unusual and unpredictable.

(B) Section 141.71(b)(1)(i) (monthly CT compliance requirements)—Determine whether failure to meet the requirements for monthly CT compliance in § 141.72(a)(1) was caused by circumstances that were unusual and unpredictable.

(C) Section 141.71(b)(1)(iii) (residual disinfectant concentration requirements)—Determine whether failure to meet the requirements for residual disinfectant concentration entering the distribution system in § 141.72(a)(3)(i) was caused by circumstances that were unusual and unpredictable.

(D) Section 141.71(b)(1)(iv) (distribution system disinfectant residual concentration requirements)—Determine whether failure to meet the requirements for distribution system residual disinfectant concentration in § 141.72(a)(4) was related to a deficiency in treatment.

(E) Section 141.71(b)(4) (system modification to prevent waterborne disease outbreak)—Determine that a system, after having been identified as the source of a waterborne disease outbreak, has been modified sufficiently to prevent another such occurrence.

(F) Section 141.71(b)(5) (total coliform MCL)—Determine whether a total coliform MCL violation was caused by a deficiency in treatment.

(G) Section 141.72(a)(1) (disinfection requirements)—Determine that different ozone, chloramine, or chlorine dioxide $CT_{99.9}$ values or conditions are adequate to achieve required disinfection.

(H) Section 141.72(a)(2)(ii) (shut-off of water to distribution system)—Determine whether a shut-off of water to the distribution system when the disinfectant residual concentration entering the distribution system is less than 0.2 mg/1 will cause an unreasonable risk to health or interfere with fire protection.

(I) Section 141.74(b)(1) (coliform monitoring)—Determine that coliform monitoring which otherwise might be required is not feasible for a system.

(J) Section 141.74(b), Table 3.1 (disinfection with chloramines)—Determine the conditions to be met to insure 99.99 percent removal and/or inactivation of viruses in systems which use either preformed chloramines or chloramines for which ammonia is added to the water before chlorine, as allowed by Table 3.1.

(c) *Total coliform requirements.* In addition to meeting the general primacy requirements of this part, an application for approval of a State program revision that adopts the requirements of the national primary drinking water regulation for total coliforms must contain the following information:

(1) The application must describe the State's plan for determining whether sample siting plans are acceptable (including periodic reviews), as required by § 141.21(a)(1).

(2) The national primary drinking water regulation for total coliforms in Part 141 gives States the option to impose lesser requirements in certain circumstances, which are listed below. If a State chooses to exercise any of these options, its application for approval of a program revision must include the information listed below (the State need only provide the information listed for those options it has chosen to use).

(i) Section 141.21(a)(2) (Reduced monitoring requirements for community water systems serving 1,000 or fewer persons)—A description of how the State will determine whether it is appropriate to reduce the total coliform monitoring frequency for such systems using the criteria in § 141.21(a)(2) and how it will determine the revised frequency.

(ii) Section 141.21(a)(3)(i) (Reduced monitoring requirements for non-community water systems using ground water and serving 1,000 persons or fewer)—A description of how the State will determine whether it is appropriate to reduce the total coliform monitoring frequency for such systems using the criteria in § 141.21(a)(3)(i) and how it will determine the revised frequency.

(iii) Section 141.21(a)(3)(ii) (Reduced monitoring for non-community water systems using ground water and serving more than 1,000 persons)—A description of how the State will determine whether it is appropriate to reduce the total coliform monitoring frequency for non-community water systems using only ground water and serving more than 1,000 persons during any month the system serves 1,000 persons or fewer and how it will determine the revised frequency.

(iv) Section 141.21(a)(5) (Waiver of time limit for sampling after a turbidity sampling result exceeds 1 NTU)—A description of how the State will determine whether it is appropriate to waive the 24-hour time limit.

(v) Section 141.21(b)(1) (Waiver of time limit for repeat samples)—A description of how the State will determine whether it is appropriate to waive the 24-hour time limit and how it will determine what the revised time limit will be.

(vi) Section 141.21(b)(3) (Alternative repeat monitoring requirements for systems with a single service connection)—A description of how the State will determine whether it is appropriate to allow a system with a single service connection to use an alternative repeat monitoring scheme, as provided in § 141.21(b)(3), and what the alternative requirements will be.

(vii) Section 141.21(b)(5) (Waiver of requirement to take five routine samples the month after a system has a total coliform-positive sample)—A description of how the State will determine whether it is appropriate to waive the requirement for certain systems to collect five routine samples during the next month it serves water to the public, using the criteria in § 141.21(b)(5).

(viii) Section 141.21(c) (Invalidation of total coliform-positive samples)—A description of how the State will determine whether it is appropriate to invalidate a total coliform-positive sample, using the criteria in § 141.21(c).

(ix) Section 141.21(d) (Sanitary surveys)—A description of the State's criteria and procedures for approving agents other than State personnel to conduct sanitary surveys.

(x) Section 141.21(e)(2) (Waiver of fecal coliform or *E. coli* testing on a total coliform-positive sample)—A description of how the State will determine whether it is appropriate to waive fecal coliform or *E. coli* testing on a total coliform-positive sample.

[54 FR 15188, Apr. 17, 1989, as amended at 54 FR 27539, June 29, 1989; 55 FR 25065, June 19, 1990]

EFFECTIVE DATE NOTE: At 54 FR 27539, June 29, 1989, § 142.16 was amended by adding paragraph (b), effective December 31, 1990.

EFFECTIVE DATE NOTE: At 54 FR 27567, June 29, 1989, § 142.16 was amended by adding a new paragraph (c), effective December 31, 1990.

§ 142.17 Review of State programs and procedures for withdrawal of approved primacy programs.

(a)(1) At least annually the Administrator shall review, with respect to each State determined to have primary enforcement responsibility, the compliance of the State with the requirements set forth in § 142.10 and the approved State primacy program. At the time of this review, the State shall notify the Administrator of any State-initiated program changes (i.e., changes other than those to adopt new or revised EPA regulations), and of any transfer of all or part of its program from the approved State agency to any other State agency.

(2) When, on the basis of the Administrator's review or other available information, the Administrator determines that a State no longer meets the requirements set forth in § 142.10, and the State has failed to request or has been denied an extension under § 142.12(b)(2) of the deadlines for meeting those requirements, or has failed to take other corrective actions required by the Administrator, the Administrator may initiate proceedings to withdraw program approval. The Administrator shall notify the State in

writing of EPA's intention to initiate withdrawal proceedings and shall summarize in the notice the information available that indicates that the State no longer meets such requirements.

(3) The State notified pursuant to paragraph (a)(2) of this section may, within 30 days of receiving the Administrator's notice, submit to the Administrator evidence demonstrating that the State continues to meet the requirements for primary enforcement responsibility.

(4) After reviewing the submission of the State, if any, made pursuant to paragraph (a)(3) of this section the Administrator shall either determine that the State no longer meets the requirements of § 142.10 or that the State continues to meet those requirements, and shall notify the State of his or her determination. Any determination that the State no longer meets the requirements of § 142.10 shall not become effective except as provided in § 142.13.

(b) If a State which has primary enforcement responsibility decides to relinquish that authority, it may do so by notifying the Administrator in writing of the State's decision at least 90 days before the effective date of the decision.

[54 FR 52140, Dec. 20, 1989]

Subpart C—Review of State-Issued Variances and Exemptions

§ 142.20 State-issued variances and exemptions.

States with primary enforcement responsibility may issue variances and exemptions from the requirements of primary drinking water regulations under conditions and in a manner which are not less stringent than the conditions under which, and the manner in which, variances and exemptions may be granted under sections 1415 and 1416 of the Act. In States that do not have primary enforcement responsibility, variances and exemptions from the requirements of applicable national primary drinking water regulations may be granted by the Administrator pursuant to Subparts E and F.

§ 142.21 State consideration of a variance or exemption request.

A State with primary enforcement responsibility shall act on any variance or exemption request submitted to it, within 90 days of receipt of the request.

§ 142.22 Review of State variances, exemptions and schedules.

(a) Not later than 18 months after the effective date of the interim national primary drinking water regulations the Administrator shall complete a comprehensive review of the variances and exemptions granted (and schedules prescribed pursuant thereto) by the States with primary enforcement responsibility during the one-year period beginning on such effective date. The Administrator shall conduct such subsequent reviews of exemptions and schedules as he deems necessary to carry out the purposes of this title, but at least one review shall be completed within each 3-year period following the completion of the first review under this paragraph.

(b) Notice of a proposed review shall be published in the FEDERAL REGISTER. Such notice shall (1) provide information respecting the location of data and other information respecting the variances and exemptions to be reviewed (including data and other information concerning new scientific matters bearing on such variances and exemptions), and (2) advise of the opportunity to submit comments on the variances and exemptions reviewed and on the need for continuing them. Upon completion of any such review, the Administrator shall publish in the FEDERAL REGISTER the results of his review, together with findings responsive to any comments submitted in connection with such review.

§ 142.23 Notice to State.

(a) If the Administrator finds that a State has, in a substantial number of instances, abused its discretion in granting variances or exemptions under section 1415(a) or section 1416(a) of the Act or failed to prescribe schedules in accordance with section 1415(a) or section 1416(b) of the Act, he shall notify the State of his findings. Such notice shall:

(1) Identify each public water system for which the finding was made;

(2) Specify the reasons for the finding; and

(3) As appropriate, propose revocation of specific variances or exemptions, or propose revised schedules for specific public water systems.

(b) The Administrator shall also notify the State of a public hearing to be held on the provisions of the notice required by paragraph (a) of this section. Such notice shall specify the time and location for the hearing. If, upon notification of a finding by the Administrator, the State takes adequate corrective action, the Administrator shall rescind his notice to the State of a public hearing, provided that the Administrator is notified of the corrective action prior to the hearing.

(c) The Administrator shall publish notice of the public hearing in the FEDERAL REGISTER and in a newspaper or newspapers of general circulation in the involved State including a summary of the findings made pursuant to paragraph (a) of this section, a statement of the time and location for the hearing, and the address and telephone number of an office at which interested persons may obtain further information concerning the hearing.

(d) Hearings convened pursuant to paragraphs (b) and (c) of this section shall be conducted before a hearing officer to be designated by the Administrator. The hearing shall be conducted by the hearing officer in an informal, orderly and expeditious manner. The hearing officer shall have authority to call witnesses, receive oral and written testimony and take such other action as may be necessary to assure the fair and efficient conduct of the hearing. Following the conclusion of the hearing, the hearing officer shall forward the record of the hearing to the Administrator.

(e) Within 180 days after the date notice is given pursuant to paragraph (b) of this section, the Administrator shall:

(1) Rescind the finding for which the notice was given and promptly notify the State of such rescission, or

(2) Promulgate with any modifications as appropriate such revocation and revised schedules proposed in such notice and promptly notify the State of such action.

(f) A revocation or revised schedule shall take effect 90 days after the State is notified under paragraph (e)(2) of this section.

§ 142.24 Administrator's rescission.

If, upon notification of a finding by the Administrator under § 142.23, the State takes adequate corrective action before the effective date of the revocation or revised schedule, the Administrator shall rescind the application of his finding to that variance, exemption or schedule.

Subpart D—Federal Enforcement

§ 142.30 Failure by State to assure enforcement.

(a) The Administrator shall notify a State and the appropriate supplier of water whenever he finds during a period in which the State has primary enforcement responsibility for public water systems that a public water system within such State is not in compliance with any primary drinking water regulation contained in Part 141 of this chapter or with any schedule or other requirements imposed pursuant to a variance or exemption granted under section 1415 or 1416 of the Act: *Provided*, That the State will be deemed to have been notified of a violation referred to in a report submitted by the State.

(b) The Administrator shall provide advice and technical assistance to such State and public water system as may be appropriate to bring the system into compliance by the earliest feasible time.

[41 FR 2918, Jan. 20, 1976, as amended at 52 FR 20675, June 2, 1987]

§ 142.31 [Reserved]

§ 142.32 Petition for public hearing.

(a) If the Administrator makes a finding of noncompliance pursuant to

§ 142.30 with respect to a public water system in a State which has primary enforcement responsibility, the Administrator may, for the purpose of assisting that State in carrying out such responsibility and upon the petition of such State or public water system or persons served by such system, hold, after appropriate notice, public hearings for the purpose of gathering information as described in § 142.33.

(b) A petition for a public hearing pursuant to paragraph (a) of this section shall be filed with the Administrator and shall include the following information:

(1) The name, address and telephone number of the individual or other entity requesting a hearing.

(2) If the petition is filed by a person other than the State or public water system, a statement that the person is served by the system.

(3) A brief statement of information that the requesting person intends to submit at the requested hearing.

(4) The signature of the individual submitting the petition; or, if the petition is filed on behalf of a State, public water system or other entity, the signature of a responsible official of the State or other entity.

§ 142.33 Public hearing.

(a) If the Administrator grants the petition for public hearing, he shall give appropriate public notice of such hearing. Such notice shall be by publication in the FEDERAL REGISTER and in a newspaper of general circulation or by other appropriate communications media covering the area served by such public water system.

(b) A hearing officer designated by the Administrator shall gather during the public hearing information from technical or other experts, Federal, State, or other public officials, representatives of the public water system, persons served by the system, and other interested persons on:

(1) The ways in which the system can within the earliest feasible time be brought into compliance, and

(2) The means for the maximum feasible protection of the public health during any period in which such system is not in compliance.

(c) On the basis of the hearing and other available information the Administrator shall issue recommendations which shall be sent to the State and public water system and shall be made available to the public and communications media.

§ 142.34 Entry and inspection of public water systems.

(a) Any supplier of water or other person subject to a national primary drinking water regulation shall, at any time, allow the Administrator, or a designated representative of the Administrator, upon presenting appropriate credentials and a written notice of inspection, to enter any establishment, facility or other property of such supplier or other person to determine whether such supplier or other person has acted or is acting in compliance with the requirements of the Act or Subchapter D of this chapter. Such inspection may include inspection, at reasonable times, of records, files, papers, processes, controls and facilities, or testing of any feature of a public water system, including its raw water source.

(b) Prior to entry into any establishment, facility or other property within a State which has primary enforcement responsibility, the Administrator shall notify, in writing, the State agency charged with responsibility for safe drinking water of his intention to make such entry and shall include in his notification a statement of reasons for such entry. The Administrator shall, upon a showing by the State agency that such an entry will be detrimental to the administration of the State's program of primary enforcement responsibility, take such showing into consideration in determining whether to make such entry. The Administrator shall in any event offer the State agency the opportunity of having a representative accompany the Administrator or his representative on such entry.

(c) No State agency which receives notice under paragraph (b) of this section may use the information contained in the notice to inform the person whose property is proposed to be entered of the proposed entry; if a

State so uses such information, notice to the agency under paragraph (b) of this section is not required for subsequent inspections of public water systems until such time as the Administrator determines that the agency has provided him satisfactory assurances that it will no longer so use information contained in a notice received under paragraph (b) of this section.

Subpart E—Variances Issued by the Administrator

§ 142.40 Requirements for a variance.

(a) The Administrator may grant one or more variances to any public water system within a State that does not have primary enforcement responsibility from any requirement respecting a maximum contaminant level of an applicable national primary drinking water regulation upon a finding that:

(1) Because of characteristics of the raw water sources which are reasonably available to the system, the system cannot meet the requirements respecting the maximum contaminant levels of such drinking water regulations despite application of the best technology, treatment techniques, or other means, which the Administrator finds are generally available (taking costs into consideration); and

(2) The granting of a variance will not result in an unreasonable risk to the health of persons served by the system.

(b) The Administrator may grant one or more variances to any public water system within a State that does not have primary enforcement responsibility from any requirement of a specified treatment technique of an applicable national primary drinking water regulation upon a finding that the public water system applying for the variance has demonstrated that such treatment technique is not necessary to protect the health of persons because of the nature of the raw water source of such system.

§ 142.41 Variance request.

A supplier of water may request the granting of a variance pursuant to this subpart for a public water system within a State that does not have primary enforcement responsibility by submitting a request for a variance in writing to the Administrator. Suppliers of water may submit a joint request for variances when they seek similar variances under similar circumstances. Any written request for a variance or variances shall include the following information:

(a) The nature and duration of variance requested.

(b) Relevant analytical results of water quality sampling of the system, including results of relevant tests conducted pursuant to the requirements of the national primary drinking water regulations.

(c) For any request made under § 142.40(a):

(1) Explanation in full and evidence of the best available treatment technology and techniques.

(2) Economic and legal factors relevant to ability to comply.

(3) Analytical results of raw water quality relevant to the variance request.

(4) A proposed compliance schedule, including the date each step toward compliance will be achieved. Such schedule shall include as a minimum the following dates:

(i) Date by which arrangement for alternative raw water source or improvement of existing raw water source will be completed.

(ii) Date of initiation of the connection of the alternative raw water source or improvement of existing raw water source.

(iii) Date by which final compliance is to be achieved.

(5) A plan for the provision of safe drinking water in the case of an excessive rise in the contaminant level for which the variance is requested.

(6) A plan for additional interim control measures during the effective period of variance.

(d) For any request made under § 142.40(b), a statement that the system will perform monitoring and other reasonable requirements prescribed by the Administrator as a condition to the variance.

(e) Other information, if any, believed to be pertinent by the applicant.

(f) Such other information as the Administrator may require.

[41 FR 2918, Jan. 20, 1976, as amended at 52 FR 20675, June 2, 1987]

§ 142.42 Consideration of a variance request.

(a) The Administrator shall act on any variance request submitted pursuant to § 142.41 within 90 days of receipt of the request.

(b) In his consideration of whether the public water system is unable to comply with a contaminant level required by the national primary drinking water regulations because of the nature of the raw water source, the Administrator shall consider such factors as the following:

(1) The availability and effectiveness of treatment methods for the contaminant for which the variance is requested.

(2) Cost and other economic considerations such as implementing treatment, improving the quality of the source water or using an alternate source.

(c) A variance may only be issued to a system after the system's application of the best technology, treatment techniques, or other means, which the Administrator finds are available (taking costs into consideration).

(d) In his consideration of whether a public water system should be granted a variance to a required treatment technique because such treatment is unnecessary to protect the public health, the Administrator shall consider such factors as the following:

(1) Quality of the water source including water quality data and pertinent sources of pollution.

(2) Source protection measures employed by the public water system.

[41 FR 2918, Jan. 20, 1976, as amended at 52 FR 20675, June 2, 1987]

§ 142.43 Disposition of a variance request.

(a) If the Administrator decides to deny the application for a variance, he shall notify the applicant of his intention to issue a denial. Such notice shall include a statement of reasons for the proposed denial, and shall offer the applicant an opportunity to present, within 30 days of receipt of the notice, additional information or argument to the Administrator. The Administrator shall make a final determination on the request within 30 days after receiving any such additional information or argument. If no additional information or argument is submitted by the applicant the application shall be denied.

(b) If the Administrator proposes to grant a variance request submitted pursuant to § 142.41, he shall notify the applicant of his decision in writing. Such notice shall identify the variance, the facility covered, and shall specify the period of time for which the variance will be effective.

(1) For the type of variance specified in § 142.40(a) such notice shall provide that the variance will be terminated when the system comes into compliance with the applicable regulation, and may be terminated upon a finding by the Administrator that the system has failed to comply with any requirements of a final schedule issued pursuant to § 142.44.

(2) For the type of variance specified in § 142.40(b) such notice shall provide that the variance may be terminated at any time upon a finding that the nature of the raw water source is such that the specified treatment technique for which the variance was granted is necessary to protect the health of persons or upon a finding that the public water system has failed to comply with monitoring and other requirements prescribed by the Administrator as a condition to the granting of the variance.

(c) For a variance specified in § 142.40(a)(1) the Administrator shall propose a schedule for:

(1) Compliance (including increments of progress) by the public water system with each contaminant level requirement covered by the variance; and,

(2) Implementation by the public water system of such additional control measures as the Administrator may require for each contaminant covered by the variance.

(d) The proposed schedule for compliance shall specify dates by which steps towards compliance are to be taken, including at the minimum, where applicable:

(1) Date by which arrangement for an alternative raw water source or im-

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provement of existing raw water source will be completed.

(2) Date of initiation of the connection for the alternative raw water source or improvement of the existing raw water source.

(3) Date by which final compliance is to be achieved.

(e) The proposed schedule may, if the public water system has no access to an alternative raw water source, and can effect or anticipate no adequate improvement of the existing raw water source, specify an indefinite time period for compliance until a new and effective treatment technology is developed at which time a new compliance schedule shall be prescribed by the Administrator.

(f) The proposed schedule for implementation of additional interim control measures during the period of variance shall specify interim treatment techniques, methods and equipment, and dates by which steps toward meeting the additional interim control measures are to be met.

(g) The schedule shall be prescribed by the Administrator at the time of granting of the variance, subsequent to provision of opportunity for hearing pursuant to § 142.44.

[41 FR 2918, Jan. 20, 1976, as amended at 52 FR 20675, June 2, 1987]

§ 142.44 Public hearings on variances and schedules.

(a) Before a variance and schedule proposed by the Administrator pursuant to § 142.43 may take effect, the Administrator shall provide notice and opportunity for public hearing on the variance and schedule. A notice given pursuant to the preceding sentence may cover the granting of more than one variance and a hearing held pursuant to such notice shall include each of the variances covered by the notice.

(b) Public notice of an opportunity for hearing on a variance and schedule shall be circulated in a manner designed to inform interested and potentially interested persons of the proposed variance and schedule, and shall include at least the following:

(1) Posting of a notice in the principal post office of each municipality or area served by the public water system, and publishing of a notice in a newspaper or newspapers of general circulation in the area served by the public water system; and

(2) Mailing of a notice to the agency of the State in which the system is located which is responsible for the State's water supply program, and to other appropriate State or local agencies at the Administrator's discretion.

(3) Such notice shall include a summary of the proposed variance and schedule and shall inform interested persons that they may request a public hearing on the proposed variance and schedule.

(c) Requests for hearing may be submitted by any interested person other than a Federal agency. Frivolous or insubstantial requests for hearing may be denied by the Administrator. Requests must be submitted to the Administrator within 30 days after issuance of the public notices provided for in paragraph (b) of this section. Such requests shall include the following information:

(1) The name, address and telephone number of the individual, organization or other entity requesting a hearing;

(2) A brief statement of the interest of the person making the request in the proposed variance and schedule, and of information that the requester intends to submit at such hearing;

(3) The signature of the individual making the request, or, if the request is made on behalf of an organization or other entity, the signature of a responsible official of the organization or other entity.

(d) The Administrator shall give notice in the manner set forth in paragraph (b) of this section of any hearing to be held pursuant to a request submitted by an interested person or on his own motion. Notice of the hearing shall also be sent to the persons requesting the hearing, if any. Notice of the hearing shall include a statement of the purpose of the hearing, information regarding the time and location for the hearing, and the address and telephone number of an office at which interested persons may obtain further information concerning the hearing. At least one hearing location specified in the public notice shall be within the involved State. Notice of hearing shall be given not less than 15 days prior to the time scheduled for the hearing.

(e) A hearing convened pursuant to paragraph (d) of this section shall be conducted before a hearing officer to be designated by the Administrator. The hearing shall be conducted by the hearing officer in an informal, orderly and expeditious manner. The hearing officer shall have authority to call witnesses, receive oral and written testimony and take such other action as may be necessary to assure the fair and efficient conduct of the hearing. Following the conclusion of the hearing, the hearing officer shall forward the record of the hearing to the Administrator.

(f) The variance and schedule shall become effective 30 days after notice of opportunity for hearing is given pursuant to paragraph (b) of this section if no timely request for hearing is submitted and the Administrator does not determine to hold a public hearing on his own motion.

[41 FR 2918, Jan. 20, 1976, as amended at 52 FR 20675, June 2, 1987]

§ 142.45 Action after hearing.

Within 30 days after the termination of the public hearing held pursuant to § 142.44, the Administrator shall, taking into consideration information obtained during such hearing and relevant information, confirm, revise or rescind the proposed variance and schedule.

[52 FR 20675, June 2, 1987]

§ 142.46 Alternative treatment techniques.

The Administrator may grant a variance from any treatment technique requirement of a national primary drinking water regulation to a supplier of water, whether or not the public water system for which the variance is requested is located in a State which has primary enforcement responsibility, upon a showing from any person that an alternative treatment technique not included in such requirement is at least as efficient in lowering the level of the contaminant with respect to which such requirements was prescribed. A variance under this paragraph shall be conditioned on the use of the alternative treatment technique which is the basis of the variance.

Subpart F—Exemptions Issued by the Administrator

§ 142.50 Requirements for an exemption.

The Administrator may exempt any public water system within a State that does not have primary enforcement responsibility from any requirement respecting a maximum contaminant level or any treatment technique requirement, or from both, of an applicable national primary drinking water regulation upon a finding that:

(a) Due to compelling factors (which may include economic factors), the public water system is unable to comply with such contaminant level or treatment technique requirement;

(b) The public water system was in operation on the effective date of such contaminant level or treatment technique requirement; and

(c) The granting of the exemption will not result in an unreasonable risk to health.

§ 142.51 Exemption request.

A supplier of water may request the granting of an exemption pursuant to this subpart for a public water system within a State that does not have primary enforcement responsibility by submitting a request for exemption in writing to the Administrator. Suppliers of water may submit a joint request for exemptions when they seek similar exemptions under similar circumstances. Any written request for an exemption or exemptions shall include the following information:

(a) The nature and duration of exemption requested.

(b) Relevant analytical results of water quality sampling of the system, including results of relevant tests conducted pursuant to the requirements of the national primary drinking water regulations.

(c) Explanation of the compelling factors such as time or economic factors which prevent such system from achieving compliance.

(d) Other information, if any, believed by the applicant to be pertinent to the application.

(e) A proposed compliance schedule, including the date when each step toward compliance will be achieved.

(f) Such other information as the Administrator may require.

§ 142.52 Consideration of an exemption request.

(a) The Administrator shall act on any exemption request submitted pursuant to § 142.51 within 90 days of receipt of the request.

(b) In his consideration of whether the public water system is unable to comply due to compelling factors, the Administrator shall consider such factors as the following:

(1) Construction, installation, or modification of the treatment equipment or systems.

(2) The time needed to put into operation a new treatment facility to replace an existing system which is not in compliance.

(3) Economic feasibility of compliance.

§ 142.53 Disposition of an exemption request.

(a) If the Administrator decides to deny the application for an exemption, he shall notify the applicant of his intention to issue a denial. Such notice shall include a statement of reasons for the proposed denial, and shall offer the applicant an opportunity to present, within 30 days of receipt of the notice, additional information or argument to the Administrator. The Administrator shall make a final determination on the request within 30 days after receiving any such additional information or argument. If no additional information or argument is submitted by the applicant, the application shall be denied.

(b) If the Administrator grants an exemption request submitted pursuant to § 142.51, he shall notify the applicant of his decision in writing. Such notice shall identify the facility covered, and shall specify the termination date of the exemption. Such notice shall provide that the exemption will be terminated when the system comes into compliance with the applicable regulation, and may be terminated upon a finding by the Administrator that the system has failed to comply with any requirements of a final schedule issued pursuant to § 142.55.

(c) The Administrator shall propose a schedule for:

(1) Compliance (including increments of progress) by the public water system with each contaminant level requirement and treatment technique requirement covered by the exemption; and

(2) Implementation by the public water system of such control measures as the Administrator may require for each contaminant covered by the exemption.

(d) The schedule shall be prescribed by the Administrator at the time the exemption is granted, subsequent to provision of opportunity for hearing pursuant to § 142.54.

[41 FR 2918, Jan. 20, 1976, as amended at 52 FR 20675, June 2, 1987]

§ 142.54 Public hearings on exemption schedules.

(a) Before a schedule proposed by the Administrator pursuant to § 142.53 may take effect, the Administrator shall provide notice and opportunity for public hearing on the schedule. A notice given pursuant to the preceding sentence may cover the proposal of more than one such schedule and a hearing held pursuant to such notice shall include each of the schedules covered by the notice.

(b) Public notice of an opportunity for hearing on an exemption schedule shall be circulated in a manner designed to inform interested and potentially interested persons of the proposed schedule, and shall include at least the following:

(1) Posting of a notice in the principal post office of each municipality or area served by the public water system, and publishing of a notice in a newspaper or newspapers of general circulation in the area served by the public water system.

(2) Mailing of a notice to the agency of the State in which the system is located which is responsible for the State's water supply program and to other appropriate State or local agencies at the Administrator's discretion.

(3) Such notices shall include a summary of the proposed schedule and

shall inform interested persons that they may request a public hearing on the proposed schedule.

(c) Requests for hearing may be submitted by any interested person other than a Federal agency. Frivolous or insubstantial requests for hearing may be denied by the Administrator. Requests must be submitted to the Administrator within 30 days after issuance of the public notices provided for in paragraph (b) of this section. Such requests shall include the following information:

(1) The name, address and telephone number of the individual, organization or other entity requesting a hearing;

(2) A brief statement of the interest of the person making the request in the proposed schedule and of information that the requesting person intends to submit at such hearing; and

(3) The signature of the individual making the request, or, if the request is made on behalf of an organization or other entity, the signature of a responsibile official of the organization or other entity.

(d) The Administrator shall give notice in the manner set forth in paragraph (b) of this section of any hearing to be held pursuant to a request submitted by an interested person or on his own motion. Notice of the hearing shall also be sent to the person requesting the hearing, if any. Notice of the hearing shall include a statement of the purpose of the hearing, information regarding the time and location of the hearing, and the address and telephone number of an office at which interested persons may obtain further information concerning the hearing. At least one hearing location specified in the public notice shall be within the involved State. Notice of the hearing shall be given not less than 15 days prior to the time scheduled for the hearing.

(e) A hearing convened pursuant to paragraph (d) of this section shall be conducted before a hearing officer to be designated by the Administrator. The hearing shall be conducted by the hearing officer in an informal, orderly and expeditious manner. The hearing officer shall have authority to call witnesses, receive oral and written testimony and take such action as may be necessary to assure the fair and efficient conduct of the hearing. Following the conclusion of the hearing, the hearing officer shall forward the record of the hearing to the Administrator.

[41 FR 2918, Jan. 20, 1976, as amended at 52 FR 20675, June 2, 1987]

§ 142.55 Final schedule.

(a) Within 30 days after the termination of the public hearing pursuant to § 142.54, the Administrator shall, taking into consideration information obtained during such hearing, revise the proposed schedule as necessary and prescribe the final schedule for compliance and interim measures for the public water system granted an exemption under § 142.52.

(b) Such schedule must require compliance as follows:

(1) In the case of an exemption granted with respect to a contaminant level or treatment technique requirement prescribed by the national primary drinking water regulations promulgated under section 1421(a) of the Safe Drinking Water Act, not later than June 19, 1987, and

(2) In the case of an exemption granted with respect to a contaminant level or treatment technique requirement prescribed by national primary drinking water regulations, other than a regulation referred to in section 1412(a), 12 months after the issuance of the exemption.

(c) If the public water system has entered into an enforceable agreement to become a part of a regional public water system, as determined by the Administrator, such schedule shall require compliance by the public water system with each contaminant level and treatment technique requirement prescribed by:

(1) Interim national primary drinking water regulations pursuant to Part 141 of this chapter, by no later than January 1, 1983; and

(2) Revised national primary drinking water regulations pursuant to Part 141 of this chapter, by no later than nine years after the effective date of such regulations.

[41 FR 2918, Jan. 20, 1976, as amended at 52 FR 20675, June 2, 1987]

§ 142.56 Extension of date for compliance.

(a) The final date for compliance provided in any schedule in the case of any exemption may be extended by the State (in the case of a State which has primary enforcement responsibility) or by the Administrator (in any other case) for a period not to exceed 3 years after the date of the issuance of the exemption if the public water system establishes that:

(1) The system cannot meet the standard without capital improvements which cannot be completed within the period of such exemption;

(2) In the case of a system which needs financial assistance for the necessary improvements, the system has entered into an agreement to obtain such financial assistance; or

(3) The system has entered into an enforceable agreement to become a part of a regional public water system; and the system is taking all practicable steps to meet the standard.

(b) In the case of a system which does not serve more than 500 service connections and which needs financial assistance for the necessary improvements, an exemption granted under paragraph (a) (1) or (2) may be renewed for one or more additional 2-year periods if the system establishes that it is taking all practicable steps to meet the requirements of paragraph (a) of this section.

[52 FR 20676, June 2, 1987]

§ 142.57 Bottled water and point-of-use devices.

(a) A State may require a public water system to use bottled water or point-of-use devices as a condition for granting an exemption from the requirements of § 141.61(a) of this part.

(b) Public water systems that use bottled water as a condition of obtaining an exemption from the requirements of § 141.61(a) must meet the requirements set out in § 142.62(f) of this part.

(c) Public water systems that use point-of-use devices as a condition for receiving an exemption must meet the requirements set out in § 142.62(g) of this part.

[52 FR 25716, July 8, 1987; 53 FR 25111, July 1, 1988]

Subpart G—Identification of Best Technology, Treatment Techniques or Other Means Generally Available

§ 142.60 Variances from the maximum contaminant level for total trihalomethanes.

(a) The Administrator, pursuant to section 1415(a)(1)(A) of the Act, hereby identifies the following as the best technology, treatment techiques or other means generally available for achieving compliance with the maximum contaminant level for total trihalomethanes (§ 141.12(c)):

(1) Use of chloramines as an alternate or supplemental disinfectant or oxidant.

(2) Use of chlorine dioxide as an alternate or supplemental disinfectant or oxidant.

(3) Improved existing clarification for THM precursor reduction.

(4) Moving the point of chlorination to reduce TTHM formation and, where necessary, substituting for the use of chlorine as a pre-oxidant chloramines, chlorine dioxide or potassium permanganate.

(5) Use of powdered activated carbon for THM precursor or TTHM reduction seasonally or intermittently at dosages not to exceed 10 mg/L on an annual average basis.

(b) The Administrator in a state that does not have primary enforcement responsibility or a state with primary enforcement responsibility (primacy state) that issues variances shall require a community water system to install and/or use any treatment method identified in § 142.60(a) as a condition for granting a variance unless the Administrator or primacy state determines that such treatment method identified in § 142.60(a) is not available and effective for TTHM control for the system. A treatment method shall not be considered to be "available and effective" for an individual system if the treatment method would not be technically appropriate and technically feasible for that system or would only result in a marginal reduction in TTHM for the system. If, upon application by a system for a variance, the Administrator or primacy state that issues variances determines that none of the treatment methods identified in § 142.60(a) is available and effective for the system, that system shall be entitled to a variance under the provisions of section 1415(a)(1)(A) of the Act. The Administrator's or primacy state's determination as to the availability and effectiveness of such treatment methods shall be based upon studies by the system and other relevant information. If a system submits information intending to demonstrate that a treatment method is not available and effective for TTHM control for that system, the Administrator or primacy state shall make a finding whether this information supports a decision that such treatment method is not available and effective for that system before requiring installation and/or use of such treatment method.

(c) Pursuant to § 142.43 (c) through (g) or corresponding state regulations, the Administrator or primacy state that issues variances shall issue a schedule of compliance that may require the system being granted the variance to examine the following treatment methods (1) to determine the probability that any of these methods will significantly reduce the level of TTHM for that system, and (2) if such probability exists, to determine whether any of these methods are technically feasible and economically reasonable, and that the TTHM reductions obtained will be commensurate with the costs incurred with the installation and use of such treatment methods for that system:

Introduction of off-line water storage for THM precursor reduction.

Aeration for TTHM reduction, where geographically and environmentally appropriate.

Introduction of clarification where not currently practiced.

Consideration of alternative sources of raw water.

Use of ozone as an alternate or supplemental disinfectant or oxidant.

(d) If the Administrator or primacy state that issues variances determines that a treatment method identified in § 142.60(c) is technically feasible, economically reasonable and will achieve TTHM reductions commensurate with the costs incurred with the installation and/or use of such treatment method for the system, the Administrator or primacy state shall require the system to install and/or use that treatment method in connection with a compliance schedule issued under the provisions of section 1415(a)(1)(A) of the Act. The Administrator's or primacy state's determination shall be based upon studies by the system and other relevant information. In no event shall the Administrator require a system to install and/or use a treatment method not described in § 142.60 (a) or (c) to obtain or maintain a variance from the TTHM Rule or in connection with any variance compliance schedule.

[48 FR 8414, Feb. 28, 1983]

§ 142.61 Variances from the maximum contaminant level for fluoride.

(a) The Administrator, pursuant to section 1415(a)(1)(A) of the Act, hereby identifies the following as the best technology, treatment techniques or other means generally available for achieving compliance with the Maximum Contaminant Level for fluoride.

(1) Activated alumina absorption, centrally applied

(2) Reverse osmosis, centrally applied

(b) The Administrator in a state that does not have primary enforcement responsibility or a state with primary enforcement responsibility (primacy state) that issues variances shall require a community water system to install and/or use any treatment method identified in § 142.61(a) as a condition for granting a variance unless the Administrator or the primacy state determines that such treatment method identified in § 142.61(a) as a condition for granting a variance is not available and effective for fluoride control for the system. A treatment method shall not be considered to be "available and effective" for an individual system if the treatment method would not be technically appropriate and technically feasible for that system. If, upon application by a system for a variance, the Administrator or primacy state that issues variances determines that none of the treatment methods identified in § 142.61(a) are available and effective for the system, that system shall be entitled to a variance under the provisions of section 1415(a)(1)(A) of the Act. The Administrator's or primacy state's determination as to the availability and effectiveness of such treatment methods shall be based upon studies by the system and other relevant information. If a system submits information to demonstrate that a treatment method is not available and effective for fluoride control for that system, the Administrator or primacy state shall make a finding whether this information supports a decision that such treatment method is not available and effective for that system before requiring installation and/or use of such treatment method.

(c) Pursuant to § 142.43(c)–(g) or corresponding state regulations, the Administrator or primacy state that issues variances shall issue a schedule of compliance that may require the system being granted the variance to examine the following treatment methods (1) to determine the probability that any of these methods will significantly reduce the level of fluoride for that system, and (2) if such probability exists, to determine whether any of these methods are technically feasible and economically reasonable, and that the fluoride reductions obtained will be commensurate with the costs incurred with the installation and use of such treatment methods for that system:

(1) Modification of lime softening;
(2) Alum coagulation;
(3) Electrodialysis;
(4) Anion exchange resins;
(5) Well field management;
(6) Alternate source;
(7) Regionalization.

(d) If the Administrator or primary state that issues variances determines that a treatment method identified in § 142.61(c) or other treatment method is technically feasible, economically reasonable, and will achieve fluoride reductions commensurate with the costs incurred with the installation and/or use of such treatment method for the system, the Administrator or primacy state shall require the system to install and/or use that treatment method in connection with a compliance schedule issued under the provisions of section 1415(a)(1)(A) of the Act. The Administrator's or primacy state's determination shall be based upon studies by the system and other relevant information.

[51 FR 11411, Apr. 2, 1986]

§ 142.62 Variances and exemptions from the maximum contaminant levels for synthetic organic chemicals.

(a) The Administrator, pursuant to section 1415(a)(1)(A) of the Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for synthetic organic chemicals: Removal using packed tower aeration; removal using granular activated carbon (except for vinyl chloride).

(b) A State shall require community water systems and non-transient non-community water systems to install and/or use any treatment method identified in § 142.62(a) as a condition for granting a variance except as provided in paragraph (c) of this section. If, after the system's installation of the treatment method, the system cannot meet the MCL, the system shall be eligible for a variance under the provisions of section 1415(a)(1)(A) of the Act.

(c) If a system can demonstrate through comprehensive engineering assessments, which may include pilot plant studies, that the treatment methods identified in § 142.62(a) would only achieve a *de minimis* reduction in contaminants, the State may issue a schedule of compliance that requires the system being granted the variance to examine other treatment methods as a condition of obtaining the variance.

(d) If the State determines that a treatment method identified in paragraph (c) of this section is technically feasible, the Administrator or primacy State may require the system to install and/or use that treatment method in connection with a compliance schedule issued under the provisions of section 1415(a)(1)(A) of the Act. The State's determination shall be based upon studies by the system and other relevant information.

(e) The State may require a public water system to use bottle water or point-of-use devices or other means as a condition of granting a variance or an exemption from the requirements of § 141.61(a), to avoid an unreasonable risk to health.

(f) Public water systems that use bottled water as a condition for receiving a variance or an exemption from the requirements of § 141.61(a) must meet the following requirements in either paragraph (f)(1) or (f)(2) of this section in addition to requirements in paragraph (f)(3) of this section:

(1) The Administrator or primacy State must require and approve a monitoring program for bottled water. The public water system must develop and put in place a monitoring program that provides reasonable assurances that the bottled water meets all MCLs. The public water system must monitor a representative sample of the bottled water for all contaminants regulated under § 141.61(a) the first quarter that it supplies the bottled water to the public, and annually thereafter. Results of the monitoring program shall be provided to the State annually.

(2) The public water system must receive a certification from the bottled water company that the bottled water supplied has been taken from an "approved source" as defined in 21 CFR 129.3(a); the bottled water company has conducted monitoring in accordance with 21 CFR 129.80(g) (1) through (3); and the bottled water does not exceed any MCLs or quality limits as set out in 21 CFR 103.35, 110, and 129. The public water system shall provide the certification to the State the first quarter after it supplies bottled water and annually thereafter.

(3) The public water system is fully responsible for the provision of sufficient quantities of bottled water to every person supplied by the public water system, via door-to-door bottled water delivery.

(g) Public water systems that use point-of-use devices as a condition for obtaining a variance or an exemption from NPDWRs for volatile organic chemicals must meet the following requirements:

(1) It is the responsibility of the public water system to operate and maintain the point-of-use treatment system.

(2) The public water system must develop a monitoring plan and obtain State approval for the plan before point-of-use devices are installed for compliance. This monitoring plan must provide health protection equivalent to a monitoring plan for central water treatment.

(3) Effective technology must be properly applied under a plan approved by the State and the microbiological safety of the water must be maintained.

(4) The State must require adequate certification of performance, field testing, and, if not included in the certification process, a rigorous engineering design review of the point-of-use devices.

(5) The design and application of the point-of-use devices must consider the tendency for an increase in heterotrophic bacteria concentrations in water treated with activated carbon. It may be necessary to use frequent backwashing, post-contactor disinfection, and Heterotrophic Plate Count monitoring to ensure that the microbiological safety of the water is not compromised.

(6) All consumers shall be protected. Every building connected to the system must have a point-of-use device installed, maintained, and adequately monitored. The State must be assured that every building is subject to treatment and monitoring, and that the rights and responsibilities of the public water system customer convey with title upon sale of property.

[52 FR 25716, July 8, 1987; 53 FR 25111, July 1, 1988]

§ 142.63 Variances and exemptions from the maximum contaminant level for total coliforms.

No variances or exemptions from the maximum contaminant level in § 141.63 of this chapter are permitted.

[54 FR 27568, June 29, 1989]

EFFECTIVE DATE NOTE: At 54 FR 27568, June 29, 1989, § 142.63 was added, effective December 31, 1990.

§ 142.64 Variances and exemptions from the requirements of Part 141, Subpart H—Filtration and Disinfection.

(a) No variances from the requirements in Part 141, Subpart H are permitted.

(b) No exemptions from the requirements in § 141.72(a)(3) and (b)(2) to provide disinfection are permitted.

[54 FR 27540, June 29, 1989]

EFFECTIVE DATE NOTE: At 54 FR 27540, June 29, 1989, § 142.64 was added, effective December 31, 1990.

Subpart H—Treatment of Indian Tribes as States

SOURCE: 53 FR 37411, Sept. 26, 1988, unless otherwise noted.

§ 142.72 Requirements for treatment as a State.

The Administrator is authorized to treat an Indian Tribe as a State (for purposes of making the Tribe eligible to apply for a Public Water System Program) if it meets the following criteria:

(a) The Indian Tribe is recognized by the Secretary of the Interior.

(b) The Indian Tribe has a tribal governing body which is currently "carrying out substantial governmental duties and powers" over a defined area, (*i.e.*, is currently performing governmental functions to promote the health, safety, and welfare of the affected population within a defined geographic area).

(c) The Indian Tribe demonstrates that the functions to be performed in regulating the public water systems that the applicant intends to regulate are within the area of the Indian Tribal government's jurisdiction.

(d) The Indian Tribe is reasonably expected to be capable, in the Administrator's judgment, of administering (in a manner consistent with the terms and purposes of the Act and all applicable regulations) an effective Public Water System program by the existence of management and technical skills necessary to administer an effective Public Water System program or a plan to acquire the additional management and/or technical skills to administer an effective Public Water System Program; by the existence of institutions to exercise executive, legislative, and judicial functions; by a history of successful managerial performance of public health or environmental programs; and by acceptable accounting and procurement procedures.

§ 142.76 Request by an Indian Tribe for a determination of treatment as a State.

An Indian Tribe may apply to the Administrator for a determination that it qualifies for treatment as a State pursuant to section 1451 of the Act. The application shall be concise and describe how the Indian Tribe will meet each of the requirements of § 142.72. The application shall consist of the following information:

(a) A statement that the Tribe is recognized by the Secretary of the Interior.

(b) A descriptive statement demonstrating that the Tribal governing body is currently carrying out substantial governmental duties and powers over a defined area. The statement shall:

(1) Describe the form of the Tribal government;

(2) Describe the types of governmental functions currently performed by the Tribal governing body such as, but not limited to, the exercise of police powers affecting (or relating to) the health, safety, and welfare of the affected population; taxation; and the exercise of the power of eminent domain; and

(3) Identify the sources of the Tribal government's authority to carry out the governmental functions currently being performed.

(c) A map or legal description of the area over which the Indian Tribe asserts jurisdiction; a statement by the Tribal Attorney General (or equivalent official) which describes the basis for the Tribe's jurisdictional assertion (including the nature or subject matter of the asserted jurisdiction); a copy of all documents such as Tribal constitutions, by-laws, charters, executive orders, codes, ordinances, and/or resolutions which support the Tribe's asserted jurisdiction; and a description of the locations of the public water systems the Tribe proposes to regulate.

(d) A narrative statement describing the capability of the Indian Tribe to administer an effective Public Water System program. The narrative statement shall include:

(1) A description of the Indian Tribe's previous management experience including, but not limited to, the administration of programs and services authorized by the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450 *et seq.*), the Indian Mineral Development Act (25 U.S.C. 2101 *et seq.*), or the Indian Sanitation Facilities Construction Activity Act (42 U.S.C. 2004a).

(2) A list of existing environmental or public health programs administered by the Tribal governing body and a copy of related Tribal laws, regulations and policies.

(3) A description of the Indian Tribe's accounting and procurement systems.

(4) A description of the entity (or entities) which exercise the executive, legislative, and judicial functions of the Tribal government.

(5) A description of the existing, or proposed, agency of the Indian Tribe which will assume primary enforcement responsibility, including a description of the relationship between owners/operators of the public water systems and the agency.

(6) A description of the technical and administrative capabilities of the staff to administer and manage an effective Public Water System Program or a plan which proposes how the Tribe will acquire additional administrative and/or technical expertise. The plan must address how the Tribe will obtain the funds to acquire the additional administrative and technical expertise.

(e) The Administrator may, in his discretion, request further documentation necessary to support a Tribal request for treatment as a State.

(f) If the Administrator has previously determined that a Tribe has met the requirement for "treatment as a State" for programs authorized under the Safe Drinking Water or the Clean Water Acts, then that Tribe may provide only that information unique to the Public Water System program (*i.e.*, §§ 142.76(c) and 142.76(d)(6)).

§ 142.78 Procedure for processing an Indian Tribe's application for treatment as a State.

(a) The Administrator shall process a completed application of an Indian Tribe for treatment as a State submitted pursuant to § 142.76 in a timely manner. He shall promptly notify the Indian Tribe of receipt of the application.

(b) Within 30 days after receipt of the Indian Tribe's completed application for treatment as a State, the Administrator shall notify the appropriate governmental entities. Notice shall include information on the substance of and basis for the Tribe's jurisdictional assertions.

(c) Each governmental entity so notified by the Administrator shall have 30 days to comment upon the Tribe's assertion of jurisdiction. Comments by governmental entities shall be limited to the Tribe's assertion of jurisdiction.

(d) If a Tribe's asserted jurisdiction is subject to a competing or conflicting claim, the Administrator, after consultation with the Secretary of the Department of the Interior, or his designee, and in consideration of other comments received, shall determine whether the Tribe has adequately demonstrated the requisite jurisdiction for primacy for the Public Water System Program.

(e) If the Administrator determines that a Tribe meets the requirements of § 142.72, the Indian Tribe is then eligible to apply for development grants and primary enforcement responsibility for a Public Water System Program and associated funding under section 1443(a) of the Act and for primary enforcement responsibility for public water systems under section 1413 of the Act.

Subpart I—Administrator's Review of State Decisions that Implement Criteria Under Which Filtration Is Required

SOURCE: 54 FR 27540, June 29, 1989, unless otherwise noted.

Effective Date Note: At 54 FR 27540, June 29, 1989, Subpart I to Part 142 was added, effective December 31, 1990.

§ 142.80 Review procedures.

(a) The Administrator may initiate a comprehensive review of the decisions made by States with primary enforcement responsibility to determine, in accordance with § 141.71 of this chapter, if public water systems using surface water sources must provide filtration treatment. The Administrator shall complete this review within one year of its initiation and shall schedule subsequent reviews as (s)he deems necessary.

(b) EPA shall publish notice of a proposed review in the FEDERAL REGISTER. Such notice must:

(1) Provide information regarding the location of data and other information pertaining to the review to be conducted and other information including new scientific matter bearing on the application of the criteria for avoiding filtration; and

(2) Advise the public of the opportunity to submit comments.

(c) Upon completion of any such review, the Administrator shall notify each State affected by the results of the review and shall make the results available to the public.

§ 142.81 Notice to the State.

(a) If the Administrator finds through periodic review or other available information that a State (1) has abused its discretion in applying the criteria for avoiding filtration under § 141.71 of this chapter in determining that a system does not have to provide filtration treatment, or (2) has failed to prescribe compliance schedules for those systems which must provide filtration in accordance with section 1412(b)(7)(C)(ii) of the Act, (s)he shall notify the State of these findings. Such notice shall:

(1) Identify each public water system for which the Administrator finds the State has abused its discretion;

(2) Specify the reasons for the finding;

(3) As appropriate, propose that the criteria of § 141.71 of this chapter be applied properly to determine the need for a public water system to provide filtration treatment or propose a revised schedule for compliance by the public water system with the filtration treatment requirements;

(b) The Administrator shall also notify the State that a public hearing is to be held on the provisions of the notice required by paragraph (a) of this section. Such notice shall specify the time and location of the hearing. If, upon notification of a finding by the Administrator that the State has abused its discretion under § 141.71 of this chapter, the State takes corrective action satisfactory to the Administrator, the Administrator may rescind the notice to the State of a public hearing.

(c) The Administrator shall publish notice of the public hearing in the FEDERAL REGISTER and in a newspaper of general circulation in the involved State, including a summary of the findings made pursuant to paragraph (a) of this section, a statement of the time and location for the hearing, and the address and telephone number of an office at which interested persons may obtain further information concerning the hearing.

(d) Hearings convened pursuant to paragraphs (b) and (c) of this section shall be conducted before a hearing officer to be designated by the Administrator. The hearing shall be conducted by the hearing officer in an informal, orderly, and expeditious manner. The hearing officer shall have the authority to call witnesses, receive oral and written testimony, and take such other action as may be necessary to ensure the fair and efficient conduct of the hearing. Following the conclusion of the hearing, the hearing officer may make a recommendation to the Administrator based on the testimony presented at the hearing and shall forward any such recommendation and the record of the hearing to the Administrator.

(e) Within 180 days after the date notice is given pursuant to paragraph (b) of this section, the Administrator shall:

(1) Rescind the notice to the State of a public hearing if the State takes corrective action satisfactory to the Administrator; or

(2) Rescind the finding for which the notice was given and promptly notify the State of such rescission; or

(3) Uphold the finding for which the notice was given. In this event, the Administrator shall revoke the State's decision that filtration was not required or revoke the compliance schedule approved by the State, and promulgate, as appropriate, with any appropriate modifications, a revised filtration decision or compliance schedule and promptly notify the State of such action.

(f) Revocation of a State's filtration decision or compliance schedule and/or promulgation of a revised filtration decision or compliance schedule shall take effect 90 days after the State is notified under paragraph (e)(3) of this section.

PART 143—NATIONAL SECONDARY DRINKING WATER REGULATIONS

Sec.
143.1 Purpose.
143.2 Definitions.
143.3 Secondary maximum contaminant levels.
143.4 Monitoring.
143.5 Compliance with secondary maximum contaminant level and public notification for fluoride.

AUTHORITY: 42 U.S.C. 300f *et seq.*

SOURCE: 44 FR 42198, July 19, 1979, unless otherwise noted.

§ 143.1 Purpose.

This part establishes National Secondary Drinking Water Regulations pursuant to section 1412 of the Safe Drinking Water Act, as amended (42 U.S.C. 300g-1). These regulations control contaminants in drinking water that primarily affect the aesthetic qualities relating to the public acceptance of drinking water. At considerably higher concentrations of these contaminants, health implications may also exist as well as aesthetic degradation. The regulations are not Federally enforceable but are intended as guidelines for the States.

§ 143.2 Definitions.

(a) "Act" means the Safe Drinking Water Act as amended (42 U.S.C. 300f *et seq.*).

(b) "Contaminant" means any physical, chemical, biological, or radiological substance or matter in water.

(c) "Public water system" means a system for the provision to the public of piped water for human consumption, if such a system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least 60 days out of the year. Such term includes (1) any collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system, and (2) any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system. A public water system is either a "community water system" or a "non-community water system."

(d) "State" means the agency of the State or Tribal government which has jurisdiction over public water systems. During any period when a State does not have responsibility pursuant to section 1443 of the Act, the term "State" means the Regional Administrator, U.S. Environmental Protection Agency.

(e) "Supplier of water" means any person who owns or operates a public water system.

(f) "Secondary maximum contaminant levels" means SMCLs which apply to public water systems and which, in the judgement of the Administrator, are requisite to protect the public welfare. The SMCL means the maximum permissible level of a contaminant in water which is delivered to the free flowing outlet of the ultimate user of public water system. Contamimants added to the water under circumstances controlled by the user, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from this definition.

[44 FR 42198, July 19, 1979, as amended at 53 FR 37412, Sept. 26, 1988]

§ 143.3 Secondary maximum contaminant levels.

The secondary maximum contaminant levels for public water systems are as follows:

Contaminant	Level
Chloride	250 mg/l.
Color	15 color units.
Copper	1 mg/l.
Corrosivity	Noncorrosive.
Fluoride	2.0 mg/l.
Foaming agents	0.5 mg/l.
Iron	0.3 mg/l.
Manganese	0.05 mg/l.
Odor	3 threshold odor number.
pH	6.5–8.5.
Sulfate	250 mg/l.
Total dissolved solids (TDS)	500 mg/l.
Zinc	5 mg/l.

These levels represent reasonable goals for drinking water quality. The States may establish higher or lower levels which may be appropriate dependent upon local conditions such as unavailability of alternate source waters or other compelling factors, provided that public health and welfare are not adversely affected.

[44 FR 42198, July 19, 1979, as amended at 51 FR 11412, Apr. 2, 1986]

§ 143.4 Monitoring.

(a) It is recommended that the parameters in these regulations should be monitored at intervals no less frequent than the monitoring performed for inorganic chemical contaminants listed in the National Interim Primary Drinking Water Regulations as applicable to community water systems. More frequent monitoring would be appropriate for specific parameters such as pH, color, odor or others under certain circumstances as directed by the State.

(b) Analyses conducted to determine compliance with § 143.3 should be made in accordance with the following methods:

(1) Chloride—Potentiometric Method, "Standard Methods for the Examination of Water and Wastewater," 14th Edition, p. 306.

(2) Color—Platinum-Cobalt Method, "Methods for Chemical Analysis of Water and Wastes," p. 36-38, EPA, Office of Technology Transfer, Washington, DC, 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 160-162, 14th Edition, p. 64-66.

(3) Cooper—Atomic Absorption Method, "Methods for Chemical Analysis of Water and Wastes," pp. 108-109, EPA, Office of Technology Transfer, Washington, DC 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 210-215, 14th Edition, pp. 144-147; or Inductively Coupled Plasma Method, "Inductively Coupled Plasma—Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes—Method 200.7," available from EPA Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

(4) Foaming Agents—Methylene Blue Method, "Methods for Chemical Analysis of Water and Wastes," pp. 157-158, EPA, Office of Technology Transfer, Washington, DC, 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 339-342, 14th Edition, p. 600.

(5) Iron—Atomic Absorption Method, "Methods for Chemical Analysis of Water and Wastes," pp. 110-111, EPA, Office of Technology Transfer, Washington, DC 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 210-215, 14th Edition, pp. 144-147; or Inductively Coupled Plasma Method, "Inductively Coupled Plasma--Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes—Method 200.7," available from EPA Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

(6) Manganese—Atomic Absorption Method, "Methods for Chemical Analysis of Water and Wastes," pp. 116-117, EPA, Office of Technology Transfer, Washington, DC 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 210-215, 14th Edition, pp. 144-147; or Inductively Coupled Plasma Method, "Inductively Coupled Plasma—Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes—Method 200.7" available from EPA Environ-

mental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

(7) Odor—Consistent Series Method, "Methods for Chemical Analysis of Water and Wastes," pp. 287-294, EPA, Office of Technology Transfer, Washington, DC, 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 248-254, 14th Edition, p. 75-82.

(8) pH—Glass Electrode Method, "Methods for Chemical Analysis of Water and Wastes," pp. 239-240, EPA, Office of Technology Transfer, Washington, DC, 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 276-281, 14th Edition, pp. 460-465.

(9) Sulfate—Turbidimetric Method, "Methods for Chemical Analysis of Water and Wastes," pp. 277-278, EPA, Office of Technology Transfer, Washington, DC, 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 334-335, 14th Edition, p. 496-498.

(10) Total Dissolved Solids—Total Residue Methods, "Methods for Chemical Analysis of Water and Wastes," pp. 270-271, EPA, Office of Technology Transfer, Washington, DC, 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 288-290, 14th Edition, p. 91-92.

(11) Zinc—Atomic Absorption Method, "Methods for Chemical Analysis of Water and Wastes," pp. 155-156, EPA, Office of Technology Transfer, Washington, DC 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 210-215, 14th Edition, pp. 144-147; or Inductively Coupled Plasma Method, "Inductively Coupled Plasma—Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes—Method 200.7," available from EPA Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

[44 FR 42198, July 19, 1979, as amended at 53 FR 5147, Feb. 19, 1988]

§ 143.5 Compliance with secondary maximum contaminant level and public notification for fluoride.

(a) Community water systems, as defined in 40 CFR 141.2(e)(i) of this title, that exceed the secondary maximum contaminant level for fluoride as determined by the last single sample taken in accordance with the requirements of § 141.23 of this title or any equivalent state law, but do not exceed the maximum contaminant level for flouride as specified by § 141.62 of thid title or any equivalent state law, shall provivde the notice described in paragraph (b) of all billing units annually, all new billing units at the time service begins, and the state public health officer.

(b) The notice required by paragraph (a) shall contain the following language including the language necessary to replace the superscripts:

PUBLIC NOTICE

Dear User,

The U.S. Environmental Protection Agency requires that we send you this notice on the level of fluoride in your drinking water. The drinking water in your community has a fluoride concentration of [1] milligrams per liter (mg/l).

Federal regulations require that fluoride, which occurs naturally in your water supply, not exceed a concentration of 4.0 mg/l in drinking water. This is an enforceable standard called a Maximum Contaminant Level (MCL), and it has been established to protect the public health. Exposure to drinking water levels above 4.0 mg/l for many years may result in some cases of crippling skeletal fluorosis, which is a serious bone disorder.

Federal law also requires that we notify you when monitoring indicates that the fluoride in your drinking water exceeds 2.0 mg/l. This is intended to alert families about dental problems that might affect children under nine years of age. The fluoride concentration of your water exceeds this federal guideline.

Fluoride in children's drinking water at levels of approximately 1 mg/l reduces the number of dental cavities. However, some children exposed to levels of fluoride greater than about 2.0 mg/l may develop dental fluorosis. Dental fluorosis, in its moderate and severe forms, is a brown staining and/or pitting of the *permanent* teeth.

Because dental fluorosis occurs only when *developing* teeth (before they erupt from the gums) are exposed to elevated fluoride levels, households without children are not expected to be affected by this level of fluoride. Families with children under the age of nine are encouraged to seek other sources of drinking water for their children to avoid the possibility of staining and pitting.

Your water supplier can lower the concentration of fluoride in your water so that you will still receive the benefits of cavity prevention while the possibility of stained and pitted teeth is minimized. Removal of fluoride may increase your water costs. Treatment systems are also commercially available for home use. Information on such systems is available at the address given below. Low fluoride bottled drinking water that would meet all standards is also commercially available.

For further information, contact [2] at your water system.

[1] PWS shall insert the compliance result which triggered notification under this Part.

[2] PWS shall insert the name, address, and telephone number of a contact person at the PWS.

(c) The effective date of this section is May 2, 1986.

[51 FR 11412, Apr. 2, 1986; 51 FR 24329, July 3, 1986, as amended at 52 FR 41550, Oct. 28, 1987]

PART 144—UNDERGROUND INJECTION CONTROL PROGRAM

Subpart A—General Provisions

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AUTHORITY: Safe Drinking Water Act, 42 U.S.C. 300f *et seq;* Resource Conservation and Recovery Act, 42 U.S.C. 6901 *et seq.*

SOURCE: 48 FR 14189, Apr. 1, 1983, unless otherwise noted.

Subpart A—General Provisions

§ 144.1 Purpose and scope of Part 144.

(a) *Contents of Part 144.* The regulations in this part set forth requirements for the Underground Injection Control (UIC) program promulgated under Part C of the Safe Drinking Water Act (SDWA) (Pub. L. 93-523, as amended; 42 U.S.C. 300f *et seq.*) and, to the extent that they deal with hazardous waste, the Resource Conservation and Recovery Act (RCRA) (Pub. L. 94-580 as amended; 42 U.S.C. 6901 *et seq.*).

(b) *Applicability.* (1) The regulations in this part establish minimum requirements for UIC programs. To the extent set forth in Part 145, each State must meet these requirements in order to obtain primary enforcement authority for the UIC program in that State.

(2) In addition to serving as minimum requirements for UIC programs, the regulations in this part constitute a part of the UIC program for States listed in Part 147 to be administered directly by EPA.

(c) The information requirements located in the following sections have been cleared by the Office of Management and Budget: Sections 144.11, 144.28(c)(d)(i), 144.31, 14.33, 144.51(j)(m) (n), 144.52(a), 144.54, 144.55, 144.15, 144.23, 144.26, 144.27, 144.28(i)(k), 144.51(o), 146.52. The OMB clearance number is 2040–0042.

(d) *Authority.* (1) Section 1421 of SDWA requires the Administrator to promulgate regulations establishing minimum requirements for effective UIC programs.

(2) Section 1422 of SDWA requires the Administrator to list in the FEDERAL REGISTER "each State for which in his judgment a State underground injection control program may be necessary to assure that underground injection will not endanger drinking water sources" and to establish by regulation a program for EPA administration of UIC programs in the absence of an approved State program in a listed State.

(3) Section 1423 of SDWA provides procedures for EPA enforcement of UIC requirements.

(4) Section 1431 authorizes the Administrator to take action to protect the health of persons when a contaminant which is present in or may enter a public water system or underground source of drinking water may present an imminent and substantial endangerment to the health of persons.

(5) Section 1445 of SDWA authorizes the promulgation of regulations for such recordkeeping, reporting, and monitoring requirements "as the Administrator may reasonably require * * * to assist him in establishing regulations under this title," and a "right of entry and inspection to determine compliance with this title, including for this purpose, inspection, at reasonable time, or records, files, papers, processes, controls, and facilities * * *."

(6) Section 1450 of SDWA authorizes the Administrator "to prescribe such regulations as are necessary or appropriate to carry out his functions" under SDWA.

(e) *Overview of the UIC program.* An UIC program is necessary in any State listed by EPA under section 1422 of the SDWA. Because all States have been listed, the SDWA requires all States to submit an UIC program within 270 days after July 24, 1980, the effective date of 40 CFR Part 146, which was the final element of the UIC minimum requirements to be originally promulgated, unless the Administrator grants an extension, which can be for a period not to exceed an additional 270 days. If a State fails to submit an approvable program, EPA will establish a program for that State. Once a program is established, SDWA provides that all underground injections in listed States are unlawful and subject to penalties unless authorized by a permit or a rule. This part sets forth the requirements governing all UIC programs, authorizations by permit or rule and prohibits certain types of injection. The technical regulations governing these authorizations appear in 40 CFR Part 146.

(f) *Structure of the UIC program*—(1) *Part 144.* This part sets forth the permitting and other program requirements that must be met by UIC Programs, whether run by a State or by EPA. It is divided into the following subparts:

(i) Subpart A describes general elements of the program, including definitions and classifications.

(ii) Subpart B sets forth the general program requirements, including the performance standards applicable to all injection activities, basic elements that all UIC programs must contain, and provisions for waiving permit of rule requirements under certain circumstances.

(iii) Subpart C sets forth requirements for wells authorized by rule.

(iv) Subpart D sets forth permitting procedures.

(v) Subpart E sets forth specific conditions, or types of conditions, that must at a minimum be included in all permits.

(vi) Subpart F sets forth the financial responsibility requirements for owners and operators of all existing and new Class I hazardous waste injection wells.

(2) *Part 145.* While Part 144 sets forth minimum requirements for all UIC Programs, these requirements are specifically identified as elements of a State application for primacy to administer an UIC Program in Part 145. Part 145 also sets forth the necessary elements of a State submission and the procedural requirements for approval of State programs.

(3) *Part 124.* The public participation requirements that must be met by UIC Programs, whether administered by the State or by EPA, are set forth in Part 124. EPA must comply with all Part 124 requirements; State administered programs must comply with Part 124 as required by Part 145. These requirements carry out the purposes of the public participation requirement of 40 CFR Part 25 (Public Participation), and supersede the requirements of that part as they apply to the UIC Program.

(4) *Part 146.* This part sets forth the technical criteria and standards that must be met in permits and authorizations by rule as required by Part 144.

(g) *Scope of the permit or rule requirement.* The UIC Permit Program regulates underground injections by five classes of wells (see definition of "well injection," § 144.3). The five classes of wells are set forth in § 144.6. All owners or operators of these injection wells must be authorized eithe by permit or rule by the Director. I carrying out the mandate of th SDWA, this subpart provides that n injection shall be authorized by perm or rule if it results in the movement (fluid containing any contaminant int Underground Sources of Drinkin Water (USDWs—see § 144.3 for defin tion), if the presence of that contam nant may cause a violation of any pr mary drinking water regulation und 40 CFR Part 142 or may adversel affect the health of persons (§ 144.12 Existing Class IV wells which inje hazardous waste directly into an u derground source of drinking wat are to be eliminated over a period (six months and new such Class I wells are to be prohibited (§ 144.13 Class V wells will be inventoried ar assessed and regulatory action will l established at a later date.

In the meantime, if remedial actio appears necessary, an individu permit may be required (§ 144.25) (the Director must require remedi action or closure by order (§ 144.12(c During UIC program development, t Director may identify aquifers a portions of aquifers which are actu or potential sources of drinking wat This will provide an aid to the Dire tor in carrying out his or her duty protect all USDWs. An aquifer is USDW if it fits the definition, even it has not been "identified." The I rector may also designate "exempt aquifers" using criteria in § 146. Such aquifers are those which wou otherwise qualify as "undergrou sources of drinking water" to be p tected, but which have no real pote tial to be used as drinking wa sources. Therefore, they are r USDWs. No aquifer is an "exempt aquifer" until it has been affirmati ly designated under the procedures § 144.7. Aquifers which do not fit t definition of "underground sources drinking water" are not "exempt aquifers." They are simply not subj to the special protection afford USDWs.

(1) *Specific inclusions.* The follo ing wells are included among th types by injection activities which covered by the UIC regulations. (T

list is not intended to be exclusive but is for clarification only.)

(i) Any injection well located on a drilling platform inside the State's territorial waters.

(ii) Any dug hole or well that is deeper than its largest surface dimension, where the principal function of the hole is emplacement of fluids.

(iii) Any septic tank or cesspool used by generators of hazardous waste, or by owners or operators of hazardous waste management facilities, to dispose of fluids containing hazardous waste.

(iv) Any septic tank, cesspool, or other well used by a multiple dwelling, community, or Regional system for the injection of wastes.

(2) Specific exclusions. The following are not covered by these regulations:

(i) Injection wells located on a drilling platform or other site that is beyond the State's territorial waters.

(ii) Individual or single family residential waste disposal systems such as domestic cesspools or septic systems.

(iii) Non-residential cesspools, septic systems or similar waste disposal systems if such systems (A) are used solely for the disposal of sanitary waste, and (B) have the capacity to serve fewer than 20 persons a day.

(iv) Injection wells used for injection of hydrocarbons which are of pipeline quality and are gases at standard temperature and pressure for the purpose of storage.

(v) Any dug hole which is not used for emplacement of fluids underground.

(3) The prohibition applicable to Class IV wells under § 144.13 does not apply to injections of hazardous wastes into aquifers or portions thereof which have been exempted pursuant to § 146.04.

(h) *Interim Status under RCRA for Class I Hazardous Waste Injection Wells.* The minimum national standards which define acceptable injection of hazardous waste during the period of interim status under RCRA are set out in the applicable provisions of this part, Parts 146 and 147, and § 265.430 of this chapter. The issuance of a UIC permit does not automatically terminate RCRA interim status. A Class I well's interim status does, however, automatically terminate upon issuance to that well of a RCRA permit, or upon the well's receiving a RCRA permit-by-rule under § 270.60(b) of this chapter. Thus, until a Class I well injecting hazardous waste receives a RCRA permit or RCRA permit-by-rule, the well's interim status requirements are the applicable requirements imposed pursuant to this part and Parts 146, 147, and 265 of this chapter, including any requirements imposed in the UIC permit.

[48 FR 14189, Apr. 1, 1983, as amended at 49 FR 20181, May 11, 1984; 52 FR 20676, June 2, 1987; 52 FR 45797, Dec. 1, 1987; 53 FR 28147, July 26, 1988]

§ 144.2 Promulgation of Class II programs for Indian lands.

Notwithstanding the requirements of this part or Parts 124 and 146 of this chapter, the Administrator may promulgate an alternate UIC Program for Class II wells on any Indian reservation or Indian lands. In promulgating such a program the Administrator shall consider the following factors:

(a) The interest and preferences of the tribal government having responsibility for the given reservation or Indian lands;

(b) The consistency between the alternate program and any program in effect in an adjoining jurisdiction; and

(c) Such other factors as are necessary and appropriate to carry out the Safe Drinking Water Act.

§ 144.3 Definitions.

Terms not defined in this section have the meaning given by the appropriate Act. When a defined term appears in a definition, the defined term is sometimes placed within quotation marks as an aid to readers.

Administrator means the Administrator of the United States Environmental Protection Agency, or an authorized representative.

Application means the EPA standard national forms for applying for a permit, including any additions, revisions or modifications to the forms; or forms approved by EPA for use in approved States, including any approved modifications or revisions.

Appropriate Act and regulations means the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA); or Safe Drinking Water Act (SDWA), whichever is applicable; and applicable regulations promulgated under those statutes.

Approved State Program means a UIC program administered by the State or Indian Tribe that has been approved by EPA according to SDWA sections 1422 and/or 1425.

Aquifer means a geological "formation," group of formations, or part of a formation that is capable of yielding a significant amount of water to a well or spring.

Area of review means the area surrounding an injection well described according to the criteria set forth in § 146.06 or in the case of an area permit, the project area plus a circumscribing area the width of which is either ¼ of a mile or a number calculated according to the criteria set forth in § 146.06.

Contaminant means any physical, chemical, biological, or radiological substance or matter in water.

Director means the Regional Administrator, the State director or the Tribal director as the context requires, or an authorized representative. When there is no approved State or Tribal program, and there is an EPA administered program, "Director" means the Regional Administrator. When there is an approved State or Tribal program, "Director" normally means the State or Tribal director. In some circumstances, however, EPA retains the authority to take certain actions even when there is an approved State or Tribal program. In such cases, the term "Director" means the Regional Administrator and not the State or Tribal director.

Draft permit means a document prepared under § 124.6 indicating the Director's tentative decision to issue or deny, modify, revoke and reissue, terminate, or reissue a "permit." A notice of intent to terminate a permit, and a notice of intent to deny a permit, as discussed in § 124.5 are types of "draft permits." A denial of a request for modification, revocation and reissuance, or termination, as discussed in § 124.5 is not a "draft permit."

Drilling mud means a heavy suspension used in drilling an "injection well," introduced down the drill pipe and through the drill bit.

Emergency permit means a UIC "permit" issued in accordance with § 144.34.

Environmental Protection Agency ("EPA") means the United States Environmental Protection Agency.

EPA means the United States "Environmental Protection Agency."

Exempted aquifer means an "aquifer" or its portion that meets the criteria in the definition of "underground source of drinking water" but which has been exempted according to the procedures in § 144.7.

Existing injection well means an "injection well" other than a "new injection well."

Facility or activity means any UIC "injection well," or an other facility or activity that is subject to regulation under the UIC program.

Fluid means any material or substance which flows or moves whether in a semisolid, liquid, sludge, gas, or any other form or state.

Formation means a body of consolidated or unconsolidated rock characterized by a degree of lithologic homogeneity which is prevailingly, but not necessarily, tabular and is mappable on the earth's surface or traceable in the subsurface.

Formation fluid means "fluid" present in a "formation" under natural conditions as opposed to introduced fluids, such as "drilling mud."

Generator means any person, by site location, whose act or process produces hazardous waste identified or listed in 40 CFR Part 261.

Ground water means water below the land surface in a zone of saturation.

Hazardous waste means a hazardous waste as defined in 40 CFR 261.3.

Hazardous waste management facility ("HWM facility") means all contiguous land, and structures, other appurtenances, and improvements on the land used for treating, storing, or disposing of hazardous waste. A facility may consist of several treatment, storage, or disposal operational units (for example, one or more landfills, surface impoundments, or combination of them).

HWM facility means "Hazardous Waste Management facility"

Indian lands means "Indian country" as defined in 18 U.S.C. 1151. That section defines Indian country as:

(a) All land within the limits of any Indian reservation under the jurisdiction of the United States government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation;

(b) All dependent Indian communities within the borders of the United States whether within the original or subsequently acquired territory thereof, and whether within or without the limits of a State; and

(c) All Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same.

Indian Tribe means any Indian Tribe having a Federally recognized governing body carrying out substantial governmental duties and powers over a defined area.

Injection well means a "well" into which "fluids" are being injected.

Injection zone means a geological "formation" group of formations, or part of a formation receiving fluids through a "well."

Interstate Agency means an agency of two or more States established by or under an agreement or compact approved by the Congress, or any other agency of two or more States or Indian Tribes having substantial powers or duties pertaining to the control of pollution as determined and approved by the Administrator under the "appropriate Act and regulations."

Major facility means any UIC "facility or activity" classified as such by the Regional Administrator, or, in the case of approved State programs, the Regional Administrator in conjunction with the State Director.

Manifest means the shipping document originated and signed by the "generator" which contains the information required by Subpart B of 40 CFR Part 262.

New injection wells means an "injection well" which began injection after a UIC program for the State applicable to the well is approved or prescribed.

Owner or operator means the owner or operator of any "facility or activity" subject to regulation under the UIC program.

Permit means an authorization, license, or equivalent control document issued by EPA or an approved State to implement the requirements of this part, Parts 145, 146 and 124. "Permit" includes an area permit (§ 144.33) and an emergency permit (§ 144.34). Permit does not include UIC authorization by rule (§ 144.21), or any permit which has not yet been the subject of final agency action, such as a "draft permit."

Person means an individual, association, partnership, corporation, municipality, State, Federal, or Tribal agency, or an agency or employee thereof.

Plugging means the act or process of stopping the flow of water, oil or gas into or out of a formation through a borehole or well penetrating that formation.

Project means a group of wells in a single operation.

Radioactive Waste means any waste which contains radioactive material in concentrations which exceed those listed in 10 CFR Part 20, Appendix B, Table II, Column 2.

RCRA means the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976 (Pub. L. 94-580, as amended by Pub. L. 95-609, Pub. L. 96-510, 42 U.S.C. 6901 *et seq.*).

Regional Administrator means the Regional Administrator of the appropriate Regional Office of the Environmental Protection Agency or the authorized representative of the Regional Administrator.

Schedule of compliance means a schedule of remedial measures included in a "permit," including an enforceable sequence of interim requirements (for example, actions, operations, or milestone events) leading to compliance with the "appropriate Act and regulations."

SDWA means the Safe Drinking Water Act (Pub. L. 93-523, as amended; 42 U.S.C. 300f *et seq.*).

Site means the land or water area where any "facility or activity" is physically located or conducted, including adjacent land used in connection with the facility or activity.

State means any of the 50 States, the District of Columbia, Guam, the Commonwealth of Puerto Rico, the Virgin Islands, American Samoa, the Trust Territory of the Pacific Islands, the Commonwealth of the Northern Mariana Islands, or an Indian Tribe treated as a State.

State Director means the chief administrative officer of any State, interstate, or Tribal agency operating an "approved program," or the delegated representative of the State director. If the responsibility is divided among two or more States, interstate, or Tribal agencies, "State Director" means the chief administrative officer of the State, interstate, or Tribal agency authorized to perform the particular procedure or function to which reference is made.

State/EPA agreement means an agreement between the Regional Administrator and the State which coordinates EPA and State activities, responsibilities and programs.

Stratum (plural strata) means a single sedimentary bed or layer, regardless of thickness, that consists of generally the same kind of rock material.

Total dissolved solids means the total dissolved (filterable) solids as determined by use of the method specified in 40 CFR Part 136.

UIC means the Underground Injection Control program under Part C of the Safe Drinking Water Act, including an "approved State program."

Underground injection means a "well injection."

Underground source of drinking water (USDW) means an aquifer or its portion:

(a)(1) Which supplies any public water system; or

(2) Which contains a sufficient quantity of ground water to supply a public water system; and

(i) Currently supplies drinking water for human consumption; or

(ii) Contains fewer than 10,000 mg/l total dissolved solids; and

(b) Which is not an exempted aquifer.

USDW means "underground source of drinking water."

Well means a bored, drilled or driven shaft, or a dug hole, whose depth is greater than the largest surface dimension.

Well injection means the subsurface emplacement of "fluids" through a bored, drilled, or driven "well;" or through a dug well, where the depth of the dug well is greater than the largest surface dimension.

[48 FR 14189, Apr. 1, 1983, as amended at 49 FR 45305, Nov. 15, 1984; 52 FR 20676, June 2, 1987; 53 FR 37412, Sept. 26, 1988]

§ 144.4 Considerations under Federal law.

The following is a list of Federal laws that may apply to the issuance of permits under these rules. When any of these laws is applicable, its procedures must be followed. When the applicable law requires consideration or adoption of particular permit conditions or requires the denial of a permit, those requirements also must be followed.

(a) The *Wild and Scenic Rivers Act*, 16 U.S.C. 1273 *et seq.* Section 7 of the Act prohibits the Regional Administrator from assisting by license or otherwise the construction of any water resources project that would have a direct, adverse effect on the values for which a national wild and scenic river was established.

(b) *The National Historic Preservation Act of 1966*, 16 U.S.C. 470 *et seq.* Section 106 of the Act and implementing regulations (36 CFR Part 800) require the Regional Administrator, before issuing a license, to adopt measures when feasible to mitigate potential adverse effects of the licensed activity and properties listed or eligible for listing in the National Register of Historic Places. The Act's requirements are to be implemented in cooperation with State Historic Preservation Officers and upon notice to, and when appropriate, in consultation with the Advisory Council on Historic Preservation.

(c) The *Endangered Species Act*, 16 U.S.C. 1531 *et seq.* Section 7 of the Act and implementing regulations (50

CFR Part 402) require the Regional Administrator to ensure, in consultation with the Secretary of the Interior or Commerce, that any action authorized by EPA is not likely to jeopardize the continued existence of any endangered or threatened species or adversely affect its critical habitat.

(d) *The Coastal Zone Management Act*, 16 U.S.C. 1451 *et seq.* Section 307(c) of the Act and implementing regulations (15 CFR Part 930) prohibit EPA from issuing a permit for an activity affecting land or water use in the coastal zone until the applicant certifies that the proposed activity complies with the State Coastal Zone Management program, and the State or its designated agency concurs with the certification (or the Secretary of Commerce overrides the States nonconcurrence).

(e) The *Fish and Wildlife Coordination Act*, 16 U.S.C. 661 *et seq.*, requires the Regional Administrator, before issuing a permit proposing or authorizing the impoundment (with certain exemptions), diversion, or other control or modification of any body of water, consult with the appropriate State agency exercising jurisdiction over wildlife resources to conserve these resources.

(f) *Executive orders.* [Reserved]

(Clean Water Act (33 U.S.C. 1251 *et seq.*), Safe Drinking Water Act (42 U.S.C. 300f *et seq.*), Clean Air Act (42 U.S.C. 7401 *et seq.*), Resource Conservation and Recovery Act (42 U.S.C. 6901 *et seq.*))

[48 FR 14189, Apr. 1, 1983, as amended at 48 FR 39621, Sept. 1, 1983]

§ 144.5 Confidentiality of information.

(a) In accordance with 40 CFR Part 2, any information submitted to EPA pursuant to these regulations may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission in the manner prescribed on the application form or instructions or, in the case of other submissions, by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice. If a claim is asserted, the information will be treated in accordance with the procedures in 40 CFR Part 2 (Public Information).

(b) Claims of confidentiality for the following information will be denied:

(1) The name and address of any permit applicant or permittee;

(2) Information which deals with the existence, absence, or level of contaminants in drinking water.

§ 144.6 Classification of wells.

Injection wells are classified as follows:

(a) *Class I.* (1) Wells used by generators of hazardous waste or owners or operators of hazardous waste management facilities to inject hazardous waste beneath the lowermost formation containing, within one-quarter mile of the well bore, an underground source of drinking water.

(2) Other industrial and municipal disposal wells which inject fluids beneath the lowermost formation containing, within one quarter mile of the well bore, an underground source of drinking water.

(b) *Class II.* Wells which inject fluids:

(1) Which are brought to the surface in connection with natural gas storage operations, or conventional oil or natural gas production and may be commingled with waste waters from gas plants which are an intergral part of production operations, unless those waters are classified as a hazardous waste at the time of injection.

(2) For enhanced recovery of oil or natural gas; and

(3) For storage of hydrocarbons which are liquid at standard temperature and pressure.

(c) *Class III.* Wells which inject for extraction of minerals including:

(1) Mining of sulfur by the Frasch process;

(2) In situ production of uranium or other metals; this category includes only in-situ production from ore bodies which have not been conventionally mined. Solution mining of conventional mines such as stopes leaching is included in Class V.

(3) Solution mining of salts or potash.

(d) *Class IV.* (1) Wells used by generators of hazardous waste or of radioactive waste, by owners or operators of hazardous waste management facilities, or by owners or operators of radioactive waste disposal sites to dispose of hazardous waste or radioactive waste into a formation which within one-quarter (¼) mile of the well contains an underground source of drinking water.

(2) Wells used by generators of hazardous waste or of radioactive waste, by owners or operators of hazardous waste management facilities, or by owners or operators of radioactive waste disposal sites to dispose of hazardous waste or radioactive waste above a formation which within one-quarter (¼) mile of the well contains an underground source of drinking water.

(3) Wells used by generators of hazardous waste or owners or operators of hazardous waste management facilities to dispose of hazardous waste, which cannot be classified under paragraph (a)(1) or (d) (1) and (2) of this section (e.g., wells used to dispose of hazardous waste into or above a formation which contains an aquifer which has been exempted pursuant to § 146.04).

(e) *Class V.* Injection wells not included in Classes I, II, III, or IV.

[48 FR 14189, Apr. 1, 1983, as amended at 52 FR 20676, June 2, 1987]

§ 144.7 Identification of underground sources of drinking water and exempted aquifers.

(a) The Director may identify (by narrative description, illustrations, maps, or other means) and shall protect, except where exempted under paragraph (b) of this section, as an underground source of drinking water, all aquifers or parts of aquifers which meet the definition of an "underground source of drinking water" in § 144.3. Even if an aquifer has not been specifically identified by the Director, it is an underground source of drinking water if it meets the definition in § 144.3.

(b)(1) The Director may identify (by narrative description, illustrations, maps, or other means) and describe in geographic and/or geometric terms (such as vertical and lateral limits and gradient) which are clear and definite, all aquifers or parts thereof which the Director proposes to designate as exempted aquifers using the criteria in 40 CFR 146.04.

(2) No designation of an exempted aquifer submitted as part of a UIC Program shall be final until approved by the Administrator as part of a UIC program.

(3) Subsequent to program approval or promulgation, the Director may, after notice and opportunity for a public hearing, identify additional exempted aquifers. For approved State programs exemption of aquifers identifed (i) under § 146.04(b) shall be treated as a program revision under § 145.32; (ii) under § 146.04(c) shall become final if the State Director submits the exemption in writing to the Administrator and the Administrator has not disapproved the designation within 45 days. Any disapproval by the Administrator shall state the reasons and shall constitute final Agency action for purposes of judicial review.

(c)(1) For Class III wells, the Director shall require an applicant for a permit which necessitates an aquifer exemption under § 146.04(b)(1) to furnish the data necessary to demonstrate that the aquifer is expected to be mineral or hydrocarbon producing. Information contained in the mining plan for the proposed project, such as a map and general description of the mining zone, general information on the mineralogy and geochemistry of the mining zone, analysis of the amenability of the mining zone to the proposed mining method, and a time-table of planned development of the mining zone shall be considered by the Director in addition to the information required by § 144.31(g).

(2) For Class II wells, a demonstration of commercial producibility shall be made as follows:

(i) For a Class II well to be used for enhanced oil recovery processes in a field or project containing aquifers from which hydrocarbons were previously produced, commercial producibility shall be presumed by the Director upon a demonstration by the applicant of historical production having occurred in the project area or field.

(ii) For Class II wells not located in a field or project containing aquifers from which hydrocarbons were previously produced, information such as logs, core data, formation description, formation depth, formation thickness and formation parameters such as permeability and porosity shall be considered by the Director, to the extent such information is available.

§ 144.8 Noncompliance and program reporting by the Director.

The Director shall prepare quarterly and annual reports as detailed below. When the State is the permit-issuing authority, the State Director shall submit any reports required under this section to the Regional Administrator. When EPA is the permit-issuing authority, the Regional Administrator shall submit any report required under this section to EPA Headquarters.

(a) *Quarterly reports.* The Director shall submit quarterly narrative reports for major facilities as follows:

(1) *Format.* The report shall use the following format:

(i) Provide an alphabetized list of permittees. When two or more permittees have the same name, the lowest permit number shall be entered first.

(ii) For each entry on the list, include the following information in the following order:

(A) Name, location, and permit number of the noncomplying permittees.

(B) A brief description and date of each instance of noncompliance for that permittee. Instances of noncompliance may include one or more the kinds set forth in paragraph (a)(2) of this section. When a permittee has noncompliance of more than one kind, combine the information into a single entry for each such permittee.

(C) The date(s) and a brief description of the action(s) taken by the Director to ensure compliance.

(D) Status of the instance(s) of noncompliance with the date of the review of the status or the date of resolution.

(E) Any details which tend to explain or mitigate the instance(s) of noncompliance.

(2) *Instances of noncompliance to be reported.* Any instances of noncompliance within the following categories shall be reported in successive reports until the noncompliance is reported as resolved. Once noncompliance is reported as resolved it need not appear in subsequent reports.

(i) *Failure to complete construction elements.* When the permittee has failed to complete, by the date specified in the permit, an element of a compliance schedule involving either planning for construction or a construction step (for example, begin construction, attain operation level); and the permittee has not returned to compliance by accomplishing the required elements of the schedule within 30 days from the date a compliance schedule report is due under the permit.

(ii) *Modifications to schedules of compliance.* When a schedule of compliance in the permit has been modified under § 144.39 or § 144.41 because of the permittee's noncompliance.

(iii) *Failure to complete or provide compliance schedule or monitoring reports.* When the permittee has failed to complete or provide a report required in a permit compliance schedule (for example, progress report or notice of noncompliance or compliance) or a monitoring report; and the permittee has not submitted the complete report within 30 days from the date it is due under the permit for compliance schedules, or from the date specified in the permit for monitoring reports.

(iv) *Deficient reports.* When the required reports provided by the permittee are so deficient as to cause misunderstanding by the Director and thus impede the review of the status of compliance.

(v) *Noncompliance with other permit requirements.* Noncompliance shall be reported in the following circumstances:

(A) Whenever the permittee has violated a permit requirement (other than reported under paragraph (a)(2)(i) or (ii) of this section), and has not returned to compliance within 45 days from the date reporting of noncompliance was due under the permit; or

(B) When the Director determines that a pattern of noncompliance exists for a major facility permittee over the most recent four consecutive reporting periods. This pattern includes any violation of the same requirement in two consecutive reporting periods, and any violation of one or more requirements in each of four consecutive reporting periods; or

(C) When the Director determines significant permit noncompliance or other significant event has occurred, such as a migration of fluids into a USDW.

(vi) *All other.* Statistical information shall be reported quarterly on all other instances of noncompliance by major facilities with permit requirements not otherwise reported under paragraph (a) of this section.

(b) *Annual reports*—(1) *Annual noncompliance report.* Statistical reports shall be submitted by the Director on nonmajor UIC permittees indicating the total number reviewed, the number of noncomplying nonmajor permittees, the number of enforcement actions, and number of permit modifications extending compliance deadlines. The statistical information shall be organized to follow the types of noncompliance listed in paragraph (a) of this section.

(2) *For State-administered UIC Programs only.* In addition to the annual noncompliance report, the State Director shall:

(i) Submit each year a program report to the Administrator (in a manner and form prescribed by the Administrator) consisting of:

(A) A detailed description of the State's implementation of its program;

(B) Suggested changes, if any to the program description (see § 145.23(f)) which are necessary to reflect more accurately the State's progress in issuing permits;

(C) An updated inventory of active underground injection operations in the State.

(ii) In addition to complying with the requirements of paragraph (b)(2)(i) of this section, the Director shall provide the Administrator, on February 28th and August 31st of each of the first two years of program operation, the information required in 40 CFR 146.15, 146.25, and 146.35.

(c) *Schedule.* (1) For all quarterly reports. On the last working day of May, August, November, and February, the State Director shall submit to the Regional Administrator information concerning noncompliance with permit requirements by major facilities in the State in accordance with the following schedule. The Regional Administrator shall prepare and submit information for EPA-issued permits to EPA Headquarters in accordance with the same schedule.

QUARTERS COVERED BY REPORTS ON NONCOMPLIANCE BY MAJOR FACILITIES

[Date for completion of reports]

January, February, and March	[1] May 31
April, May, and June	[1] Aug. 31
July, August, and September	[1] Nov. 30
October, November, and December	[1] Feb. 28

[1] Reports must be made available to the public for inspection and copying on this date.

(2) *For all annual reports.* The period for annual reports shall be for the calendar year ending December 31, with reports completed and available to the public no more than 60 days later.

Subpart B—General Program Requirements

§ 144.11 Prohibition of unauthorized injection.

Any underground injection, except as authorized by permit or rule issued under the UIC program, is prohibited. The construction of any well required to have a permit is prohibited until the permit has been issued.

§ 144.12 Prohibition of movement of fluid into underground sources of drinking water.

(a) No owner or operator shall construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR Part 142 or may otherwise adversely affect the health of persons. The applicant for a permit shall have the burden of showing that the requirements of this paragraph are met.

(b) For Class I, II and III wells, if any water quality monitoring of an underground source of drinking water indicates the movement of any contaminant into the underground source of drinking water, except as authorized under Part 146, the Director shall prescribe such additional requirements for construction, corrective action, operation, monitoring, or reporting (including closure of the injection well) as are necessary to prevent such movement. In the case of wells authorized by permit, these additional requirements shall be imposed by modifying the permit in accordance with § 144.39, or the permit may be terminated under § 144.40 if cause exists, or appropriate enforcement action may be taken if the permit has been violated. In the case of wells authorized by rule, see §§ 144.21 through 144.24. For EPA administered programs, such enforcement action shall be taken in accordance with appropriate sections of the SDWA.

(c) For Class V wells, if at any time the Director learns that a Class V well may cause a violation of primary drinking water regulations under 40 CFR Part 142, he or she shall:

(1) Require the injector to obtain an individual permit;

(2) Order the injector to take such actions (including, where required, closure of the injection well) as may be necessary to prevent the violation. For EPA administered programs, such orders shall be issued in accordance with the appropriate provisions of the SDWA; or

(3) Take enforcement action.

(d) Whenever the Director learns that a Class V well may be otherwise adversely affecting the health of persons, he or she may prescribe such actions as may be necessary to prevent the adverse effect, including any action authorized under paragraph (c) of this section.

(e) Notwithstanding any other provision of this section, the Director may take emergency action upon receipt of information that a contaminant which is present in or likely to enter a public water system or underground source of drinking water may present an imminent and substantial endangerment to the health of persons. If the Director is an EPA official, he must first determine that the appropriate State and local authorities have not taken appropriate action to protect the health of such persons, before taking emergency action.

[48 FR 14189, Apr. 1, 1983, as amended at 52 FR 20676, June 2, 1987]

§ 144.13 Prohibition of Class IV wells.

(a) The following are prohibited, except as provided in paragraph (c) of this section:

(1) The construction of any Class IV well.

(2) The operation or maintenance of any Class IV well not in operation prior to July 18, 1980.

(3) The operation or maintenance of any Class IV well that was in operation prior to July 18, 1980, after six months following the effective date of a UIC program approved or promulgated for the state.

(4) Any increase in the amount of hazardous waste or change in the type of hazardous waste injected into a Class IV well.

(b) The owner or operator of a Class IV well shall comply with the requirements of § 144.14, and with the requirements of § 144.23 regarding closure of Class IV wells.

(c) Wells used to inject contaminated ground water that has been treated and is being reinjected into the same formation from which it was drawn are not prohibited by this section if such injection is approved by EPA pursuant to provisions for cleanup of releases under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. 9601-9657, or pursuant to requirements and provisions under the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. 6901 through 6987.

(d) *Clarification.* The following wells are not prohibited by this action:

(1) Wells used to inject hazardous waste into aquifers or portions thereof that have been exempted pursuant to § 146.4, if the exempted aquifer into which waste is injected underlies the lowermost formation containing a USDW. Such wells are Class I wells as specified in § 144.6(a)(1), and the

owner or operator must comply with the requirements applicable to Class I wells.

(2) Wells used to inject hazardous waste where no USDW exists within one quarter mile of the well bore in any underground formation, provided that the Director determines that such injection is into a formation sufficiently isolated to ensure that injected fluids do not migrate from the injection zone. Such wells are Class I wells as specified in § 144.6(a)(1), and the owner or operator must comply with the requirements applicable to Class I wells.

[49 FR 20181, May 11, 1984]

§ 144.14 Requirements for wells injecting hazardous waste.

(a) *Applicability.* The regulations in this section apply to all generators of hazardous waste, and to the owners or operators of all hazardous waste management facilities, using any class of well to inject hazardous wastes accompanied by a manifest. (See also § 144.13.)

(b) *Authorization.* The owner or operator of any well that is used to inject hazardous waste required to be accompanied by a manifest or delivery document shall apply for authorization to inject as specified in § 144.31 within 6 months after the approval or promulgation of the State UIC program.

(c) *Requirements.* In addition to complying with the applicable requirements of this part and 40 CFR Part 146, the owner or operator of each facility meeting the requirements of paragraph (b) of this section, shall comply with the following:

(1) *Notification.* The owner or operator shall comply with the notification requirements of section 3010 of Pub. L. 94-580.

(2) *Identification number.* The owner or operator shall comply with the requirements of 40 CFR 264.11.

(3) *Manifest system.* The owner or operator shall comply with the applicable recordkeeping and reporting requirements for manifested wastes in 40 CFR 264.71.

(4) *Manifest discrepancies.* The owner or operator shall comply with 40 CFR 264.72.

(5) *Operating record.* The owner or operator shall comply with 40 CFR 264.73(a), (b)(1), and (b)(2).

(6) *Annual report.* The owner or operator shall comply with 40 CFR 264.75.

(7) *Unmanifested waste report.* The owner or operator shall comply with 40 CFR 264.75.

(8) *Personnel training.* The owner or operator shall comply with the applicable personnel training requirements of 40 CFR 264.16.

(9) *Certification of closure.* When abandonment is completed, the owner or operator must submit to the Director certification by the owner or operator and certification by an independent registered professional engineer that the facility has been closed in accordance with the specifications in § 144.52(a)(6).

(d) *Additional requirements for Class IV wells.* [Reserved]

§ 144.15 Assessment of Class V wells.

Assessment of Class V Wells. The Director shall, within three years of the approval of the program in a State submit a report and recommendations to EPA in compliance with § 146.52(b).

§ 144.16 Waiver of requirement by Director.

(a) *When injection does not occur into, through or above an underground source of drinking water,* the Director may authorize a well or project with less stringent requirements for area of review, construction, mechanical integrity, operation, monitoring, and reporting than required in 40 CFR Part 146 or § 144.52 to the extent that the reduction in requirements will not result in an increased risk of movement of fluids into an underground source of drinking water.

(b) When injection occurs through or above an underground source of drinking water, but the radius of endangering influence when computed under § 146.06(a) is smaller or equal to the radius of the well, the Director may authorize a well or project with less stringent requirements for operation, monitoring, and reporting than required in 40 CFR Part 146 or § 144.52 to the extent that the reduc tion in requirements will not result in an increased risk of movement of fluids into an underground source of drinking water.

(c) When reducing requirements under paragraph (a) or (b) of this section, the Director shall prepare a fact sheet under § 124.8 explaining the reasons for the action.

Subpart C—Authorization of Underground Injection by Rule

§ 144.21 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells.

Injection into existing Class I, II (except existing enhanced recovery and hydrocarbon storage), and III wells is authorized.

(a) *Duration.* The authorization under this section expires:

(1) Upon the effective date of the permit or permit denial, if a permit application has been filed in a timely manner as specified in § 144.31(c)(1);

(2) If a permit application has not been filed in a timely manner as specified in § 144.31(c)(1); or

(3)(i) For Class I and III wells:

(A) In approved State programs, five years after approval or promulgation of the UIC program unless a complete permit application is pending; or

(B) In EPA administered programs, one year after promulgation of the UIC program unless a complete permit application is pending.

(ii) For Class II wells except enhanced recovery and hydrocarbon storage, five years after approval or promulgation of the UIC program unless a complete permit application is pending.

(b) *Class II and III wells in existing fields or projects.* Notwithstanding the prohibition in § 144.11, this section authorizes Class II and Class III wells or projects in existing fields or projects to continue normal operations until permitted, including construction, operation, and plugging and abandonment of wells as part of the operation, provided the owner or operator maintains compliance with all applicable requirements.

(c) *Requirements.* The owner or operator of a well authorized under this section shall comply with the applicable requirements of § 144.28 and Part 147 of this chapter no later than one year after authorization.

[48 FR 14189, Apr. 1, 1983, as amended at 49 FR 20181, May 11, 1984]

§ 144.22 Existing Class II enhanced recovery and hydrocarbon storage wells.

(a) Injection into existing Class II enhanced recovery and hydrocarbon storage wells is authorized for the life of the well or project.

(b) *Requirements.* The owner or operator of a well authorized under this section shall comply with the applicable requirements of § 144.28 and Part 147 of this chapter. Such owner or operator shall comply with the casing and cementing requirements no later than 3 years and other requirements no later than 1 year after authorization.

[49 FR 20181, May 11, 1984]

§ 144.23 Class IV wells.

(a) Injection into existing Class IV wells is authorized for up to six months after approval or promulgation of the UIC Program. Such wells are subject to the requirements of § 144.13 and § 144.14(c).

(b) *Closure.* For EPA administered programs only,

(1) Prior to abandoning any Class IV well, the owner or operator shall plug or otherwise close the well in a manner acceptable to the Regional Administrator.

(2) Within 60 days after promulgation of the UIC program in the State, the owner or operator of a Class IV well shall submit to the Regional Administrator for approval a plan for plugging or otherwise closing and abandoning the well.

(3) The owner or operator of a Class IV well must notify the Regional Administrator of intent to abandon the well at least thirty days prior to abandonment.

[49 FR 20181, May 11, 1984]

§ 144.24 Class V wells.

Injection into Class V wells is authorized until further requirements under future regulations become applicable.

§ 144.25 Requiring a permit.

(a) The Director may require any Class I, II, III, or V injection well authorized by a rule to apply for and obtain an individual or area UIC permit. Cases where individual or area UIC permits may be required include:

(1) The injection well is not in compliance with any requirement of the rule;

NOTE: Any underground injection which violates any authorization by rule is subject to appropriate enforcement action.

(2) The injection well is not or no longer is within the category of wells and types of well operations authorized in the rule;

(3) The protection of USDWs requires that the injection operation be regulated by requirements, such as for corrective action, monitoring and reporting, or operation, which are not contained in the rule.

(4) When the injection well is a Class I; II (except existing enhanced recovery and hydrocarbon storage) or III well, in accordance with a schedule established by the Director pursuant to § 144.31(c).

(b) For EPA administered programs, the Regional Administrator may require an owner or operator authorized by a rule to apply for an individual or area UIC permit under this paragraph only if the owner or operator has been notified in writing that a permit application is required. The injection activities are no longer authorized by rule upon the effective date of a permit or a permit denial, or upon failure by the owner or operator to submit an application in a timely manner as specified in the notice. The notice shall include: a brief statement of the reasons for requiring a permit; an application form; a statement setting a time for the owner or operator to file the application; and a statement of the consequences of denial or issuance of the permit, or failure to submit an application, as described in this paragraph.

(c) Any owner or operator authorized by a rule may request to be excluded from the coverage of the rules by applying for an individual or area UIC permit. The owner or operator shall submit an application under § 144.31 with reasons supporting the request, to the Director. The Directo may grant any such requests.

[48 FR 14189, Apr. 1, 1983, as amended at FR 20182, May 11, 1984]

§ 144.26 Inventory requirements.

Owners or operators of all injectio wells authorized by rule shall subm inventory information to the Directo Any authorization under this subpa automatically terminates for an owner or operator who fails to compl within the time specified in paragrap (c) of this section.

(a) *Contents.* As part of the invent ry, the Director shall require and th owner/operator shall provide at lea the following information:

(1) Facility name and location;

(2) Name and address of legal co tact;

(3) Ownership of facility;

(4) Nature and type of injectio wells; and

(5) Operating status of injectio wells.

NOTE: This information is requested national form "Inventory of Injecti Wells," OMB No. 158-R0170.

(b) *Additional contents.* For EPA a ministered programs only, the own or operator of a well listed in par graph (b)(1) of this section shall pr vide the information listed in par graph (b)(2) of this section.

(1) This section applies to the f lowing wells:

(i) Class II enhanced recovery wel

(ii) Class IV wells;

(iii) The following Class V wells:

(A) Sand or other backfill we [§ 146.5(e)(8)];

(B) Radioactive waste disposal we [§ 146.5(e)(11)];

(C) Geothermal energy recove wells [§ 146.5(e)(12)];

(D) Brine return flow we [§ 146.5(e)(14)];

(E) Wells used in experimental te nologies [§ 146.5(e)(15)];

(F) Municipal and industrial dispo wells other than Class I; and

(G) Any other Class V wells at t discretion of the Regional Administ tor.

(2) The owner or operator of a w listed in paragraph (b)(1) shall prov

a listing of all wells owned or operated setting forth the following information for each well. (A single description of wells at a single facility with substantially the same characteristics is acceptable).

(i) For Class II only, the field name(s);

(ii) Location of each well or project given by Township, Range, Section, and Quarter-Section, or by latitude and longitude to the nearest second, according to the conventional practice in the State;

(iii) Date of completion of each well;

(iv) Identification and depth of the formation(s) into which each well is injecting;

(v) Total depth of each well;

(vi) Casing and cementing record, tubing size, and depth of packer;

(vii) Nature of the injected fluids;

(viii) Average and maximum injection pressure at the wellhead;

(ix) Average and maximum injection rate; and

(x) Date of the last mechanical integrity test, if any.

(c) *Notice.* Upon approval of the UIC Program in a State, the Director shall notify owners or operators of injection wells of their duty to submit inventory information. The method of notification selected by the Director must assure that the owners or operators will be made aware of the inventory requirement.

(d) *Deadlines.* (1) The owner or operator of an injection well shall submit inventory information no later than one year after the date of approval or effective date of the UIC program for the State. The Director need not require inventory information from any facility with interim status under RCRA.

(2) For EPA administered programs the information need not be submitted if a complete permit application is submitted within one year of the effective data of the UIC program. The owner or operator of Class IV well shall submit inventory information no later than 60 days after the effective date of the program.

[48 FR 14189, Apr. 1, 1983, as amended at 49 FR 20182, May 11, 1984]

§ 144.27 Requiring other information.

(a) For EPA administered programs only, in addition to the inventory requirements of § 144.26, the Regional Administrator may require the owner or operator of any well authorized by rule under this subpart to submit information as deemed necessary by the Regional Administrator to determine whether a well may be endangering an underground source of drinking water in violation of § 144.12 of this part.

(b) Such information requirements may include, but are not limited to:

(1) Performance of ground-water monitoring and the periodic submission of reports of such monitoring;

(2) An analysis of injected fluids, including periodic submission of such analyses; and

(3) A description of the geologic strata through and into which injection is taking place.

(c) Any request for information under this section shall be made in writing, and include a brief statement of the reasons for requiring the information. An owner or operator shall submit the information within the time period(s) provided in the notice.

Any authorization by rule under this subpart automatically terminates for any owner or operator who fails to comply with a request for information under this section.

[49 FR 20182, May 11, 1984]

§ 144.28 Requirements for Class I, II, and III wells authorized by rule.

The following requirements apply to the owner or operator of a Class I, II, and III wells authorized by rule, as provided by §§ 144.21(c) and 144.22(b).

(a) The owner or operator shall comply with all applicable requirements of this subpart and Subpart B of this part. Any noncompliance with these requirements constitutes a violation of the Safe Drinking Water Act and is grounds for enforcement action, except that the owner or operator need not comply with these requirements to the extent and for the duration such noncompliance is authorized by an emergency permit under § 144.34.

(b) *Twenty-four hour reporting.* The owner or operator shall report any noncompliance which may endanger health or the environment, including:

(1) Any monitoring or other information which indicates that any contaminant may cause an endangerment to a USDW; or

(2) Any noncompliance or malfunction of the injection system which may cause fluid migration into or between USDWs.

Any information shall be provided orally within 24 hours from the time the owner or operator becomes aware of the circumstances. A written submission shall also be provided within five days of the time the owner or operator becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause, the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

(c) *Plugging and abandonment plan.* (1) The owner or operator shall prepare, maintain, and comply with a plan for plugging and abandonment of the well or project that meets the requirements of § 146.10 of this chapter and is acceptable to the Director. For purposes of this paragraph, temporary intermittent cessation of injection operations is not abandonment

(2) For EPA administered programs:

(i) The owner or operator shall submit the plan, on a form provided by the Regional Administrator, no later than one year after the effective date of the UIC program in the state.

(ii) The owner or operator shall submit any proposed significant revision to the method of plugging reflected in the plan no later than the notice of plugging required by § 144.28(j)(2) (i.e., 45 days prior to plugging unless shorter notice is approved).

(iii) The plan shall include the following information:

(A) The nature and quantity and material to be used in plugging;

(B) The location and extent (by depth) of the plugs;

(C) Any proposed test or measurement to be made;

(D) The amount, size, and location (by depth) of casing to be left in the well;

(E) The method and location where casing is to be parted; and

(G) The estimated cost of plugging the well.

(iv) After a cessation of operations of two years the owner or operator shall plug and abandon the well in accordance with the plan unless he:

(A) Provides notice to the Regional Administrator;

(B) Describe actions or procedures, satisfactory to the Regional Administrator, that the owner or operator will take to ensure that the well will not endanger USDWs during the period of temporary abandonment. These actions and procedures shall include compliance with the technical requirements applicable to active injection wells unless waived by the Regional Administrator.

(v) The owner or operator of any well that has been temporarily abandoned [ceased operations for more than two years and has met the requirements of paragraphs (c)(2) (A) and (B) of this section] shall notify the Regional Administrator prior to resuming operation of the well.

(d) *Financial responsibility.* (1) The owner or operator of a Class I, II, or III well is required to maintain financial responsibility and resources to close, plug, and abandon the underground injection operation in a manner prescribed by the Director. The owner or operator shall show evidence of such financial responsibility to the Director by the submission of a surety bond, or other adequate assurance, such as a financial statement.

(2) For EPA administered programs the owner or operator shall submit such evidence no later than one year after the effective date of the UIC program in the State.

(3) For EPA administered programs the Regional Administrator may require the owner or operator to submit a revised demonstration of financial responsibility if the Regional Administrator has reason to believe that the original demonstration is no longer adequate to cover the cost of closing, plugging and abandoning the well.

(4) For EPA administered programs the owner or operator of a well injecting hazardous waste must comply with the financial responsibility requirements of Subpart F of this part.

(e) *Casing and cementing requirements.* For enhanced recovery and hydrocarbon storage wells:

(1) The owner or operator shall case and cement the well to prevent movement of fluids into or between underground sources of drinking water. In determining and specifying casing and cementing requirements, the following factors shall be considered:

(i) Depth to the injection zone;

(ii) Depth to the bottom of all USDWs; and

(iii) Estimated maximum and average injection pressures.

(2) In addition, in determining and specifying casing and cementing requirements the Director may consider information on:

(i) Nature of formation fluids;

(ii) Lithology of injection and confining zones;

(iii) External pressure, internal pressure, and axial loading;

(iv) Hole size;

(v) Size and grade of all casing strings; and

(vi) Class of cement.

(3) The requirements in paragraphs (e) (1) and (2) of this section need not apply if:

(i) Regulatory controls for casing and cementing existed at the time of drilling of the well and the well is in compliance with those controls; and

(ii) Well injection will not result in the movement of fluids into an underground source of drinking water so as to create a significant risk to the health of persons.

(4) When a State did not have regulatory controls for casing and cementing prior to the time of the submission of the State program to the Administrator, the Director need not apply the casing and cementing requirements in paragraph (e)(1) of this section if he submits as a part of his application for primacy, an appropriate plan for casing and cementing of existing, newly converted, and newly drilled wells in existing fields, and the Administrator approves the plan.

(f) *Operating requirements.* (1) Injection between the outermost casing protecting underground sources of drinking water and the well bore is prohibited.

(2) For Class I wells, unless an alternative to a packer has been approved under § 146.12(c) of this chapter, the owner or operator shall fill the annulus between the tubing and the long string of casings with a fluid approved by the Director and maintain a pressure, also approved by the Director, on the annulus. For EPA administered programs, the owner or operator of a Class I well completed with tubing and packer shall fill the annulus between tubing and casing with a noncorrosive fluid and maintain a positive pressure on the annulus. For other Class I wells, the owner or operator shall insure that the alternative completion method will reliably provide a comparable level of protection to underground sources of drinking water.

(3) Injection pressure.

(i) For Class I and III wells:

(A) Except during stimulation, the owner or operator shall not exceed an injection pressure at the wellhead which shall be calculated so as to assure that the pressure during injection does not initiate new fractures or propagate existing fractures in the injection zone; and

(B) The owner or operator shall not inject at a pressure which will initiate fractures in the confining zone or cause the movement of injection or formation fluids into an underground source of drinking water.

(ii) For Class II wells:

(A) The owner or operator shall not exceed a maximum injection pressure at the wellhead which shall be calculated so as to assure that the pressure during injection does not initiate new fractures of propagate existing fractures in the confining zone adjacent to the USDWs; and

(B) The owner or operator shall not inject at a pressure which will cause the movement of injection or formation fluids into an underground source of drinking water.

(g) *Monitoring requirements.* The owner or operator shall perform the monitoring as described in this paragraph. For EPA administered programs, monitoring of the nature of the injected fluids shall comply with applicable analytical methods cited and described in Table I of 40 CFR 136.3 or in Appendix III of 40 CFR Part 261 or by other methods that have been approved by the Regional Administrator.

(1) The owner or operator of a Class I well shall:

(i) Analyze the nature of the injected fluids with sufficient frequency to yield data representative of their characteristics;

(ii) Install and use continuous recording devices to monitor injection pressure, flow rate and volume, and the pressure on the annulus between the tubing and the long string of casing;

(iii) Install and use monitoring wells within the area of review if required by the Director, to monitor any migration of fluids into and pressure in the underground sources of drinking water. The type, number and location of the wells, the parameters to be measured, and the frequency of monitoring must be approved by the Director.

(2) For Class II wells:

(i) The owner or operator shall monitor the nature of the injected fluids with sufficient frequency to yield data representative of their characteristics. For EPA administered programs, this frequency shall be at least once within the first year of the authorization and thereafter when changes are made to the fluid.

(ii) The owner or operator shall observe the injection pressure, flow rate, and cumulative volume at least with the following frequencies:

(A) Weekly for produced fluid disposal operations;

(B) Monthly for enhanced recovery operations;

(C) Daily during the injection of liquid hydrocarbons and injection for withdrawal of stored hydrocarbons; and

(D) Daily during the injection phase of cyclic steam operations.

(iii) The owner or operator shall record one observation of injection pressure, flow rate and cumulative volume at reasonable intervals no greater than thirty days.

(iv) For enhanced recovery and hydrocarbon storage wells:

(A) The owner or operator shall demonstrate mechanical integrity pursuant to § 146.8 of this chapter at least once every five years during the life of the injection well.

(B) For EPA administered programs, the Regional Administrator by written notice may require the owner or operator to comply with a schedule describing when such demonstrations shall be made.

(C) For EPA administered programs, the owner or operator of any well required to be tested for mechanical integrity shall notify the Regional Administrator at least 30 days prior to any required mechanical integrity test. The Regional Administrator may allow a shorter notification period if it would be sufficient to enable EPA to witness the mechanical integrity testing if it chose. Notification may be in the form of a yearly or quarterly schedule of planned mechanical integrity tests, or it may be on an individual basis.

(v) The owner or operator of a hydrocarbon storage or enhanced recovery wells may monitor them by manifold monitoring on a field or project basis rather than on an individual well basis if such facilities consist of more than one injection well, operate with a common manifold, and provided the owner or operator demonstrates to the Director that manifold monitoring is comparable to individual well monitoring.

(3)(i) For Class III wells the owner or operator shall provide to the Director a qualitative analysis and ranges in concentrations of all constituents of injected fluids at least once within the first year of authorization and thereafter whenever the injection fluid is modified to the extent that the initial data are incorrect or incomplete. The owner or operator may request Federal confidentiality as specified in 40 CFR Part 2. If the information is proprietary the owner or operator may in lieu of the ranges in concentrations choose to submit maximum concentrations which shall not be exceeded. In such a case the owner or operator shall retain records of the undisclosed concentrations and provide them upon request to the Regional Administrator as part of any enforcement investigation; and

(ii) Monitor injection pressure and either flow rate or volume semi-monthly, or meter and record daily injected and produced fluid volumes as appropriate;

(iii) Monitor the fluid level in the injection zone semi-monthly, where appropriate;

(iv) All Class III wells may be monitored on a field or project basis rather than an individual well basis by manifold monitoring. Manifold monitoring may be used in cases of facilities consisting of more than one injection well, operating with a common manifold. Separate monitoring systems for each well are not required provided the owner or operator demonstrates to the Director that manifold monitoring is comparable to individual well monitoring.

(h) *Reporting requirements.* The owner or operator shall submit reports to the Director as follows:

(1) For Class I wells, quarterly reports on:

(i) The physical, chemical, and other relevant characteristics of the injection fluids;

(ii) Monthly average, maximum, and minimum values for injection pressure, flow rate and volume, and annular pressure;

(iii) The results from ground-water monitoring wells prescribed in paragraph (g)(1)(iii) of this section;

(iv) The results of any test of the injection well conducted by the owner or operator during the reported quarter if required by the Director; and

(v) Any well work over performed during the reported quarter.

(2) For Class II wells:

(i) An annual report to the Director summarizing the results of all monitoring, as required in paragraph (g)(2) of this section. Such summary shall include monthly records of injected fluids, and any major changes in characteristics or sources of injected fluids. Previously submitted information may be included by reference.

(ii) The owner or operator of hydrocarbon storage and enhanced recovery projects may report on a field or project basis rather than on an individual well basis where manifold monitoring is used.

(3) For Class III wells:

(i) Quarterly reporting on all monitoring, as required in paragraph (g)(3) of this section;

(ii) Quarterly reporting of the results of any periodic tests required by the Director that are performed during the reported quarter;

(iii) Monitoring may be reported on a project or field basis rather than an individual well basis where manifold monitoring is used.

(i) *Retention of records.* The owner or operator shall retain records of all monitoring information, including the following:

(1) Calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, and copies of all reports required by this section, for a period of at least three years from the date of the sample, measurement, or report. This period may be extended by request of the Director at any time; and

(2) The nature and composition of all injected fluids until three years after the completion of any plugging and abandonment procedures specified under § 144.52(l)(6). The Director may require the owner or operator to deliver the records to the Director at the conclusion of the retention period. For EPA administered programs, the owner or operator shall continue to retain the records after the three year retention period unless he delivers the records to the Regional Administrator or obtains written approval from the Regional Administrator to discard the records.

(j) *Notice of abandonment.* (1) The owner or operator shall notify the Director, according to a time period required by the Director, before conversion or abandonment of the well.

(2) For EPA-administered programs, the owner or operator shall notify the Regional Administrator at least 45 days before plugging and abandonment. The Regional Administrator, at his discretion, may allow a shorter notice period.

(k) *Plugging and abandonment report.* For EPA-administered programs, within 60 days after plugging a well or at the time of the next quarterly report (whichever is less) the owner or operator shall submit a report to the Regional Administrator. If the quarterly report is due less than 15 days before completion of plugging, then the report shall be submitted within 60 days. The report shall be certified as accurate by the person who performed the plugging operation. Such report shall consist of either:

(1) A statement that the well was plugged in accordance with the plan previously submitted to the Regional Administrator; or

(2) Where actual plugging differed from the plan previously submitted, an updated version of the plan, on the form supplied by the Regional Administrator, specifying the different procedures used.

(l) *Change of ownership.* For EPA administered programs, the owner or operator shall notify the Regional Administrator of a transfer of ownership of the well within 30 days of such transfer.

(m) *Requirements for Class I hazardous waste wells.* The owner or operator of any Class I well injecting hazardous waste shall comply with § 144.14(c). In addition, for EPA-administered programs the owner or operator shall properly dispose of, or decontaminate by removing all hazardous waste residues, all injection well equipment.

[49 FR 20182, May 11, 1984]

Subpart D—Authorization by Permit

§ 144.31 Application for a permit; authorization by permit.

(a) *Permit application.* Except for owners or operators authorized by rule, all underground injections wells are prohibited unless authorized by permit. Persons currently authorized by rule must still apply for a permit under this section unless authorization was for the life of the well or project. Rules authorizing well injections for which permit applications have been submitted shall lapse for a particular well injection or project upon the effective date of the permit or permit denial for that well injection
or project. Procedures for app
tions, issuance and administratio
emergency permits are found e
sively in § 144.34. A RCRA permit
plying the standards of Part 264
part X will constitute a UIC permi
hazardous waste injection wells
which the technical standards in
146 are not generally appropriate.

(b) *Who applies?* When a facilit
activity is owned by one person b
operated by another person, it is
operator's duty to obtain a permit.

(c) *Time to apply.* Any person
performs or proposes an undergro
injection for which a permit is or
be required shall submit an appl
tion to the Director in accorda
with the UIC program as follows:

(1) For existing wells, as expediti
ly as practicable and in accorda
with the schedule in any program
scription under § 145.23(f) or (for
administered programs) on a sched
established by the Regional Admi
trator, but no later than 4 years f
the approval or promulgation of
UIC program, or as required un
§ 144.14(b) for wells injecting haz
ous waste. For EPA administered
grams the owner or operator of Cl
or III wells shall submit a compl
permit application no later than
year after the effective date of
program.

(2) For new injection wells, exc
new wells in projects authorized un
§ 144.21(b) or covered by an exist
area permit under § 144.33(c), a r
sonable time before construction is
pected to begin.

(d) *Completeness.* The Director sh
not issue a permit before receiving
complete application for a per
except for emergency permits. An
plication for a permit is compl
when the Director receives an appli
tion form and any supplemental inf
mation which are completed to his
her satisfaction. The completeness
any application for a permit shall
judged independently of the status
any other permit application or per
for the same facility or activity. F
EPA-administered programs, an app
cation which is reviewed under § 12
is complete when the Director receiv
either a complete application or t

information listed in a notice of deficiency.

(e) *Information requirements.* All applicants for permits shall provide the following information to the Director, using the application form provided by the Director.

(1) The activities conducted by the applicant which require it to obtain permits under RCRA, UIC, the National Pollution Discharge Elimination system (NPDES) program under the Clean Water Act, or the Prevention of Significant Deterioration (PSD) program under the Clean Air Act.

(2) Name, mailing address, and location of the facility for which the application is submitted.

(3) Up to four SIC codes which best reflect the principal products or services provided by the facility.

(4) The operator's name, address, telephone number, ownership status, and status as Federal, State, private, public, or other entity.

(5) Whether the facility is located on Indian lands.

(6) A listing of all permits or construction approvals received or applied for under any of the following programs:

(i) Hazardous Waste Management program under RCRA.

(ii) UIC program under SDWA.

(iii) NPDES program under CWA.

(iv) Prevention of Significant Deterioration (PSD) program under the Clean Air Act.

(v) Nonattainment program under the Clean Air Act.

(vi) National Emission Standards for Hazardous Pollutants (NESHAPS) preconstruction approval under the Clean Air Act.

(vii) Ocean dumping permits under the Marine Protection Research and Sanctuaries Act.

(viii) Dredge and fill permits under section 404 of CWA.

(ix) Other relevant environmental permits, including State permits.

(7) A topographic map (or other map if a topographic map is unavailable) extending one mile beyond the property boundaries of the source depicting the facility and each of its intake and discharge structures; each of its hazardous waste treatment, storage, or disposal facilities; each well where fluids from the facility are injected underground; and those wells, springs, and other surface water bodies, and drinking water wells listed in public records or otherwise known to the applicant within a quarter mile of the facility property boundary.

(8) A brief description of the nature of the business.

(9) For EPA-administered programs, the applicant shall identify and submit on a list with the permit application the names and addresses of all owners of record of land within one-quarter mile of the facility boundary. This requirement may be waived by the Regional Administrator where the site is located in a populous area and the Regional Administrator determines that the requirement would be impracticable.

(f) *Recordkeeping.* Applicants shall keep records of all data used to complete permit applications and any supplemental information submitted under § 144.31 for a period of at least 3 years from the date the application is signed.

(g) *Information Requirements for Class I Hazardous Waste Injection Wells Permits.* (1) The following information is required for each active Class I hazardous waste injection well at a facility seeking a UIC permit:

(i) Dates well was operated.

(ii) Specification of all wastes which have been injected in the well, if available.

(2) The owner or operator of any facility containing one or more active hazardous waste injection wells must submit all available information pertaining to any release of hazardous waste or constituents from any active hazardous waste injection well at the facility.

(3) The owner or operator of any facility containing one or more active Class I hazardous waste injection wells must conduct such preliminary site investigations as are necessary to determine whether a release is occurring, has occurred, or is likely to have occurred.

[48 FR 14189, Apr. 1, 1983, as amended at 49 FR 20185, May 11, 1984; 52 FR 45797, Dec. 1, 1987; 52 FR 46963, Dec. 10, 1987]

§ 144.32 Signatories to permit applications and reports.

(a) *Applications.* All permit applications, except those submitted for Class II wells (see paragraph (b) of this section), shall be signed as follows:

(1) *For a corporation:* by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means; (i) A president, secretary, treasurer, or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decisionmaking functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

NOTE: EPA does not require specific assignments or delegations of authority to responsible corporate officers identified in § 144.32(a)(1)(i). The Agency will presume that these responsible corporate officers have the requisite authority to sign permit applications unless the corporation has notified the Director to the contrary. Corporate procedures governing authority to sign permit applications may provide for assignment or delegation to applicable corporate positions under § 144.32(a)(1)(ii) rather than to specific individuals.

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(3) *For a municipality, State, Federal, or other public agency:* by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes: (i) The chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

(b) *Reports.* All reports required by permits, other information requested by the Director, and all permit applications submitted for Class II wells under § 144.31 shall be signed by a person described in paragraph (a) of this section, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in paragraph (a) of this section;

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, or position of equivalent responsibility. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and

(3) The written authorization is submitted to the Director.

(c) *Changes to authorization.* If an authorization under paragraph (b) of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph (b) of this section must be submitted to the Director prior to or together with any reports, information, or applications to be signed by an authorized representative.

(d) *Certification.* Any person signing a document under paragraph (a) or (b) of this section shall make the following certification:

> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

(Clean Water Act (33 U.S.C. 1251 *et seq.*), Safe Drinking Water Act (42 U.S.C. 300f *et seq.*), Clean Air Act (42 U.S.C. 7401 *et seq.*), Resource Conservation and Recovery Act (42 U.S.C. 6901 *et seq.*))

[48 FR 14189, Apr. 1, 1983, as amended at 48 FR 39621, Sept. 1, 1983]

§ 144.33 Area permits.

(a) The Director may issue a permit on an area basis, rather than for each well individually, provided that the permit is for injection wells:

(1) Described and identified by location in permit application(s) if they are existing wells, except that the Director may accept a single description of wells with substantially the same characteristics;

(2) Within the same well field, facility site, reservoir, project, or similar unit in the same State;

(3) Operated by a single owner or operator; and

(4) Used to inject other than hazardous waste.

(b) Area permits shall specify:

(1) The area within which underground injections are authorized, and

(2) The requirements for construction, monitoring, reporting, operation, and abandonment, for all wells authorized by the permit.

(c) The area permit may authorize the permittee to construct and operate, convert, or plug and abandon wells within the permit area provided:

(1) The permittee notifies the Director at such time as the permit requires;

(2) The additional well satisfies the criteria in paragraph (a) of this section and meets the requirements specified in the permit under paragraph (b) of this section; and

(3) The cumulative effects of drilling and operation of additional injection wells are considered by the Director during evaluation of the area permit application and are acceptable to the Director.

(d) If the Director determines that any well constructed pursuant to paragraph (c) of this section does not satisfy any of the requirements of paragraphs (c) (1) and (2) of this section the Director may modify the permit under § 144.39, terminate under § 144.40, or take enforcement action. If the Director determines that cumulative effects are unacceptable, the permit may be modified under § 144.39.

§ 144.34 Emergency permits.

(a) *Coverage*. Notwithstanding any other provision of this part or Part 124, the Director may temporarily permit a specific underground injection if:

(1) An imminent and substantial endangerment to the health of persons will result unless a temporary emergency permit is granted; or

(2) A substantial and irretrievable loss of oil or gas resources will occur unless a temporary emergency permit is granted to a Class II well; and

(i) Timely application for a permit could not practicably have been made; and

(ii) The injection will not result in the movement of fluids into underground sources of drinking water; or

(3) A substantial delay in production of oil or gas resources will occur unless a temporary emergency permit is granted to a new Class II well and the temporary authorization will not result in the movement of fluids into an underground source of drinking water.

(b) *Requirements for issuance*. (1) Any temporary permit under paragraph (a)(1) of this section shall be for no longer term than required to prevent the hazard.

(2) Any temporary permit under paragraph (a)(2) of this section shall be for no longer than 90 days, except that if a permit application has been submitted prior to the expiration of the 90-day period, the Director may extend the temporary permit until final action on the application.

(3) Any temporary permit under paragraph (a)(3) of this section shall be issued only after a complete permit application has been submitted and shall be effective until final action on the application.

(4) Notice of any temporary permit under this paragraph shall be published in accordance with § 124.11 within 10 days of the issuance of the permit.

(5) The temporary permit under this section may be either oral or written. If oral, it must be followed within 5 calendar days by a written temporary emergency permit.

(6) The Director shall condition the temporary permit in any manner he or she determines is necessary to ensure that the injection will not result in the

movement of fluids into an underground source of drinking water.

[48 FR 14189, Apr. 1, 1983, as amended at 49 FR 20185, May 11, 1984]

§ 144.35 Effect of a permit.

(a) Except for Class II and III wells, compliance with a permit during its term constitutes compliance, for purposes of enforcement, with Part C of the SDWA. However, a permit may be modified, revoked and reissued, or terminated during its term for cause as set forth in §§ 144.39 and 144.40.

(b) The issuance of a permit does not convey any property rights of any sort, or any exclusive privilege.

(c) The issuance of a permit does not authorize any injury to persons or property or invasion of other private rights, or any infringement of State or local law or regulations.

§ 144.36 Duration of permits.

(a) Permits for Class I and Class V wells shall be effective for a fixed term not to exceed 10 years. UIC permits for Class II and III wells shall be issued for a period up to the operating life of the facility. The Director shall review each issued Class II or III well UIC permit at least once every 5 years to determine whether it should be modified, revoked and reissued, terminated, or a minor modification made as provided in §§ 144.39, 144.40, and 144.41.

(b) Except as provided in § 144.37, the term of a permit shall not be extended by modification beyond the maximum duration specified in this section.

(c) The Director may issue any permit for a duration that is less than the full allowable term under this section.

§ 144.37 Continuation of expiring permits.

(a) *EPA permits.* When EPA is the permit-issuing authority, the conditions of an expired permit continue in force under 5 U.S.C. 558(c) until the effective date of a new permit if:

(1) The permittee has submitted a timely application which is a complete application for a new permit; and

(2) The Regional Administrator, through no fault of the permittee does not issue a new permit with an effective date on or before the expiration date of the previous permit (for example, when issuance is impracticable due to time or resource constraints).

(b) *Effect.* Permits continued under this section remain fully effective and enforceable.

(c) *Enforcement.* When the permittee is not in compliance with the conditions of the expiring or expired permit the Regional Administrator may choose to do any or all of the following:

(1) Initiate enforcement action based upon the permit which has been continued;

(2) Issue a notice of intent to deny the new permit. If the permit is denied, the owner or operator would then be required to cease the activities authorized by the continued permit or be subject to enforcement action for operating without a permit;

(3) Issue a new permit under Part 124 with appropriate conditions; or

(4) Take other actions authorized by these regulations.

(d) *State continuation.* An EPA issued permit does not continue in force beyond its time expiration date under Federal law if at that time a State is the permitting authority. A State authorized to administer the UIC program may continue either EPA or State-issued permits until the effective date of the new permits, if State law allows. Otherwise, the facility or activity is operating without a permit from the time of expiration of the old permit to the effective date of the State-issued new permit.

§ 144.38 Transfer of permits.

(a) *Transfers by modification.* Except as provided in paragraph (b) of this section, a permit may be transferred by the permittee to a new owner or operator only if the permit has been modified or revoked and reissued (under § 144.39(b)(2)), or minor modification made (unde § 144.41(d)), to identify the new pe mittee and incorporate such other requirements as may be necessary unde the Safe Drinking Water Act.

(b) *Automatic transfers.* As an alte native to transfers under paragra (a) of this section, any UIC permit f well not injecting hazardous waste ay be automatically transferred to a ew permittee if:

(1) The current permittee notifies he Director at least 30 days in ad- ance of the proposed transfer date re- erred to in paragraph (b)(2) of this ection;

(2) The notice includes a written greement between the existing and new permittees containing a specific date for transfer or permit responsibil- ty, coverage, and liability between them, and the notice demonstrates that the financial responsibility requirements of § 144.52(a)(7) will be met by the new permittee; and

(3) The Director does not notify the existing permittee and the proposed new permittee of his or her intent to modify or revoke and reissue the permit. A modification under this paragraph may also be a minor modification under § 144.41. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in paragraph (b)(2) of this section.

§ 144.39 Modification or revocation and reissuance of permits.

When the Director receives any information (for example, inspects the facility, receives information submitted by the permittee as required in the permit (see § 144.51 of this chapter), receives a request for modification or revocation and reissuance under § 124.5, or conducts a review of the permit file) he or she may determine whether or not one or more of the causes listed in paragraphs (a) and (b) of this section for modification or revocation and reissuance or both exist. If cause exists, the Director may modify or revoke and reissue the permit accordingly, subject to the limitations of paragraph (c) of this section, and may request an updated application if necessary. When a permit is modified, only the conditions subject to modification are reopened. If a permit is revoked and reissued, the entire permit is reopened and subject to revision and the permit is reissued for a new term. See § 124.5(c)(2) of this chapter. If cause does not exist under this section or § 144.41 of this chapter, the Director shall not modify or revoke and reissue the permit. If a permit modification satisfies the criteria in § 144.41 for "minor modifications" the permit may be modified without a draft permit or public review. Otherwise, a draft permit must be prepared and other procedures in Part 124 must be followed.

(a) *Causes for modification.* The following are causes for modification. For Class I hazardous waste injection wells, Class II, or Class III wells the following may be causes for revocation and reissuance as well as modification; and for all other wells the following may be cause for revocation or reissuance as well as modification when the permittee requests or agrees.

(1) *Alterations.* There are material and substantial alterations or additions to the permitted facility or activity which occurred after permit issuance which justify the application of permit conditions that are different or absent in the existing permit.

(2) *Information.* The Director has received information. Permits other than for Class II and III wells may be modified during their terms for this cause only if the information was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and would have justified the application of different permit conditions at the time of issuance. For UIC area permits (§ 144.33), this cause shall include any information indicating that cumulative effects on the environment are unacceptable.

(3) *New regulations.* The standards or regulations on which the permit was based have been changed by promulgation of new or amended standards or regulations or by judicial decision after the permit was issued. Permits other than for Class I hazardous waste injection wells, Class II, or Class III wells may be modified during their terms for this cause only as follows:

(i) For promulgation of amended standards or regulations, when:

(A) The permit condition requested to be modified was based on a promulgated Part 146 regulation; and

(B) EPA has revised, withdrawn, or modified that portion of the regulation on which the permit condition was based, and

(C) A permittee requests modification in accordance with § 124.5 within ninety (90) days after FEDERAL REGISTER notice of the action on which the request is based.

(ii) For judicial decisions, a court of competent jurisdiction has remanded and stayed EPA promulgated regulations if the remand and stay concern that portion of the regulations on which the permit condition was based and a request is filed by the permittee in accordance with § 124.5 within ninety (90) days of judicial remand.

(4) *Compliance schedules.* The Director determines good cause exists for modification of a compliance schedule, such as an act of God, strike, flood, or materials shortage or other events over which the permittee has little or no control and for which there is no reasonably available remedy. See also § 144.41(c) (minor modifications).

(b) *Causes for modification or revocation and reissuance.* The following are causes to modify or, alternatively, revoke and reissue a permit:

(1) Cause exists for termination under § 144.40, and the Director determines that modification or revocation and reissuance is appropriate.

(2) The Director has received notification (as required in the permit, see § 144.41(d)) of a proposed transfer of the permit. A permit also may be modified to reflect a transfer after the effective date of an automatic transfer (§ 144.38(b)) but will not be revoked and reissued after the effective date of the transfer except upon the request of the new permittee.

(3) A determination that the waste being injected is a hazardous waste as defined in § 261.3 either because the definition has been revised, or because a previous determination has been changed.

(c) *Facility siting.* Suitability of the facility location will not be considered at the time of permit modification or revocation and reissuance unless new information or standards indicate that a threat to human health or the environment exists which was unknown at the time of permit issuance.

[48 FR 14189, Apr. 1, 1983, as amended at 53 FR 28147, July 26, 1988]

§ 144.40 Termination of permits.

(a) The Director may terminate a permit during its term, or deny a permit renewal application for the following causes:

(1) Noncompliance by the permittee with any condition of the permit;

(2) The permittee's failure in the application or during the permit issuance process to disclose fully all relevant facts, or the permittee's misrepresentation of any relevant facts at any time; or

(3) A determination that the permitted activity endangers human health or the environment and can only be regulated to acceptable levels by permit modification or termination;

(b) The Director shall follow the applicable procedures in Part 124 in terminating any permit under this section.

§ 144.41 Minor modifications of permits.

Upon the consent of the permittee, the Director may modify a permit to make the corrections or allowances for changes in the permitted activity listed in this section, without following the procedures of Part 124. Any permit modification not processed as a minor modification under this section must be made for cause and with Part 124 draft permit and public notice as required in § 144.39. Minor modifications may only:

(a) Correct typographical errors;

(b) Require more frequent monitoring or reporting by the permittee;

(c) Change an interim compliance date in a schedule of compliance, provided the new date is not more than 120 days after the date specified in the existing permit and does not interfere with attainment of the final compliance date requirement; or

(d) Allow for a change in ownership or operational control of a facility where the Director determines that no other change in the permit is necessary, provided that a written agreement containing a specific date for transfer of permit responsibility, coverage, and liability between the current and new permittees has been submitted to the Director.

(e) Change quantities or types of fluids injected which are within the pacity of the facility as permitted d, in the judgment of the Director, ould not interfere with the operation the facility or its ability to meet nditions described in the permit and ould not change its classification.

(f) Change construction requireents approved by the Director pursut to § 144.52(a)(1) (establishing UIC rmit conditions), provided that any ch alteration shall comply with the quirements of this part and Part 6.

(g) Amend a plugging and abandonent plan which has been updated der § 144.52(a)(6).

Subpart E—Permit Conditions

44.51 Conditions applicable to all permits.

The following conditions apply to all IC permits. All conditions applicable all permits shall be incorporated to the permits either expressly or by ference. If incorporated by referce, a specific citation to these regutions (or the corresponding approved ate regulations) must be given in the rmit.

(a) *Duty to comply.* The permittee ust comply with all conditions of is permit. Any permit noncomplice constitutes a violation of the Safe rinking Water Act and is grounds for forcement action; for permit termiation, revocation and reissuance, or odification; or for denial of a permit newal application; except that the rmittee need not comply with the ovisions of this permit to the extent d for the duration such noncomplice is authorized in an emergency rmit under § 144.34.

(b) *Duty to reapply.* If the permittee ishes to continue an activity regulatd by this permit after the expiration ate of this permit, the permittee ust apply for and obtain a new rmit.

(c) *Need to halt or reduce activity ot a defense.* It shall not be a defense r a permittee in an enforcement ction that it would have been necesry to halt or reduce the permitted ctivity in order to maintain complince with the conditions of this rmit.

(d) *Duty to mitigate.* The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit.

(e) *Proper operation and maintenance.* The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

(f) *Permit actions.* This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

(g) *Property rights.* This permit does not convey any property rights of any sort, or any exclusive privilege.

(h) *Duty to provide information.* The permittee shall furnish to the Director, within a time specified, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

(i) *Inspection and entry.* The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

(1) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

(2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

(3) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

(4) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the SDWA, any substances or parameters at any location.

(j) *Monitoring and records.* (1) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

(2) The permittee shall retain records of all monitoring information, including the following:

(i) Calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report, or application. This period may be extended by request of the Director at any time; and

(ii) The nature and composition of all injected fluids until three years after the completion of any plugging and abandonment procedures specified under § 144.52(a)(6), or under Part 146 Subpart G as appropriate. The Director may require the owner or operator to deliver the records to the Director at the conclusion of the retention period. For EPA administered programs, the owner or operator shall continue to retain the records after the three year retention period unless he delivers the records to the Regional Administrator or obtains written approval from the Regional Administrator to discard the records.

(3) Records of monitoring information shall include:

(i) The date, exact place, and time of sampling or measurements;

(ii) The individual(s) who performed the sampling or measurements;

(iii) The date(s) analyses were performed;

(iv) The individual(s) who performed the analyses;

(v) The analytical techniques or methods used; and

(vi) The results of such analyses.

(k) *Signatory requirement.* All applications, reports, or information submitted to the Administrator shall be signed and certified. (See § 144.32.)

(l) *Reporting requirements.* (1) *Planned changes.* The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility.

(2) *Anticipated noncompliance.* The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

(3) *Transfers.* This permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Safe Drinking Water Act. (See § 144.38; in some cases, modification or revocation and reissuance is mandatory.)

(4) *Monitoring reports.* Monitoring results shall be reported at the intervals specified elsewhere in this permit.

(5) *Compliance schedules.* Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 30 days following each schedule date.

(6) *Twenty-four hour reporting.* The permittee shall report any noncompliance which may endanger health or the environment, including:

(i) Any monitoring or other information which indicates that any contaminant may cause an endangerment to a USDW; or

(ii) Any noncompliance with a permit condition or malfunction of the injection system which may cause fluid migration into or between USDWs.

Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause, the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

(7) *Other noncompliance.* The permittee shall report all instances of noncompliance not reported under paragraphs (l) (4), (5), and (6) of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph (l)(6) of this section.

(8) *Other information.* Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, it shall promptly submit such facts or information.

(m) *Requirements prior to commencing injection.* Except for all new wells authorized by an area permit under § 144.33(c), a new injection well may not commence injection until construction is complete, and

(1) The permittee has submitted notice of completion of construction to the Director; and

(2)(i) The Director has inspected or otherwise reviewed the new injection well and finds it is in compliance with the conditions of the permit; or

(ii) The permittee has not received notice form the Director of his or her intent to inspect or otherwise review the new injection well within 13 days of the date of the notice in paragraph (m)(1) of this section, in which case prior inspection or review is waived and the permittee may commence injection. The Director shall include in his notice a reasonable time period in which he shall inspect the well.

(n) The permittee shall notify the Director at such times as the permit requires before conversion or abandonment of the well or in the case of area permits before closure of the project.

(o) *Plugging and abandonment report.* For EPA-administered programs, within 60 days after plugging a well or at the time of the next quarterly report (whichever is less) the owner or operator shall submit a report to the Regional Administrator. If the quarterly report is due less than 15 days before completion of plugging, then the report shall be submitted within 60 days. The report shall be certified as accurate by the person who performed the plugging operation. Such report shall consist of either:

(1) A statement that the well was plugged in accordance with the plan previously submitted to the Regional Administrator; or

(2) Where actual plugging differed from the plan previously submitted, and updated version of the plan on the form supplied by the regional administrator, specifying the differences.

(p) *Mechanical integrity demonstrations.* For EPA administered programs, the Regional Administrator by written notice may require the owner or operator to comply with a schedule describing when such demonstrations shall be made.

[48 FR 14189, Apr. 1, 1983, as amended at 49 FR 20185, May 11, 1984; 53 FR 28147, July 26, 1988]

§ 144.52 Establishing permit conditions.

(a) In addition to conditions required in § 144.51, the Director shall establish conditions, as required on a case-by-case basis under § 144.36 (duration of permits), § 144.53(a) (schedules of compliance), §144.54 (monitoring), and for EPA permits only § 144.53(b) (alternate schedules of compliance), and § 144.4 (considerations under Federal law). Permits for owners or operators of hazardous waste injection wells shall include conditions meeting the requirements of § 144.14 (requirements for wells injecting hazardous waste), §§ 144.52(a)(7) and (a)(9), and subpart G of Part 146. Permits for other wells shall contain the following requirements, when applicable.

(1) *Construction requirements* as set forth in Part 146. Existing wells shall achieve compliance with such require-

ments according to a compliance schedule established as a permit condition. The owner or operator of a proposed new injection well shall submit plans for testing, drilling, and construction as part of the permit application. Except as authorized by an area permit, no constuction may commence until a permit has been issued containing construction requirements (see § 144.11). New wells shall be in compliance with these requirements prior to commencing injection operations. Changes in construction plans during construction may be approved by the Administrator as minor modifications (§ 144.41). No such changes may be physically incorporated into construction of the well prior to approval of the modification by the Director.

(2) *Corrective action* as set forth in § 144.55 and § 146.7

(3) *Operation requirements* as set forth in 40 CFR Part 146; the permit shall establish any maximum injection volumes and/or pressures necessary to assure that fractures are not initiated in the confining zone, that injected fluids do not migrate into any underground source of drinking water, that formation fluids are not displaced into any underground source of drinking water, and to assure compliance with the Part 146 operating requirements.

(4) *Requirements for wells managing hazardous waste,* as set forth in § 144.14.

(5) Monitoring and reporting requirements as set forth in 40 CFR Part 146. The permittee shall be required to identify types of tests and methods used to generate the monitoring data. For EPA administered programs, monitoring of the nature of injected fluids shall comply with applicable analytical methods cited and described in Table I of 40 CFR 136.3 or in Appendix III of 40 CFR Part 261 or in certain circumstances by other methods that have been approved by the Regional Administrator.

(6) After a cessation of operations of two years the owner or operator shall plug and abandon the well in accordance with the plan unless he:

(i) Provides notice to the Regional Administrator;

(ii) Describes actions or procedures, satisfactory to the Regional Administrator, that the owner or operator wil take to ensure that the well will no endanger USDWs during the period o temporary abandonment. These ac tions and procedures shall includ compliance with the technical requirements applicable to active injectio wells unless waived by the Regiona Administrator.

(7) *Financial responsibility.* Th permittee is required to maintain fi nancial responsibility and resources t close, plug, and abandon the underground injection operation in manner prescribed by the Director The permittee shall show evidence o such financial responsibility to the D rector by the submission of a suret bond, or other adequate assuranc such as financial statements or othe materials acceptable to the Director For EPA administered programs, th Regional Administrator may on a per odic basis require the holder of a lifetime permit to submit an estimate o the resources needed to plug an abandon the well revised to reflect inflation of such costs, and a revise demonstration of financial responsibi ity if necessary. The owner or operato of a well injecting hazardous wast must comply with the financial responsibility requirements of Subpart of this part.

(8) *Mechanical integrity.* A permi for any Class I, II or III well or injection project which lacks mechanic integrity shall include, and for an Class V well may include, a conditio prohibiting injection operations unt the permittee shows to the satisfaction of the Director under § 146.0 that the well has mechanical integrity

(9) *Additional conditions.* The D rector shall impose on a case-by-cas basis such additional conditions as ar necessary to prevent the migration o fluids into underground sources o drinking water.

(b)(1) In addition to conditions required in all permits the Director shal establish conditions in permits as required on a case-by-case basis, to provide for and assure compliance with al applicable requirements of the SDW and Parts 144, 145, 146 and 124.

(2) For a State issued permit, an applicable requirement is a State statutory or regulatory requirement which

takes effect prior to final administrative disposition of the permit. For a permit issued by EPA, an applicable requirement is a statutory or regulatory requirement (including any interim final regulation) which takes effect prior to the issuance of the permit (except as provided in § 124.86(c) for UIC permits being processed under Subpart E or F of Part 124). Section 124.14 (reopening of comment period) provides a means for reopening EPA permit proceedings at the discretion of the Director where new requirements become effective during the permitting process and are of sufficient magnitude to make additional proceedings desirable. For State and EPA administered programs, an applicable requirement is also any requirement which takes effect prior to the modification or revocation and reissuance of a permit, to the extent allowed in § 144.39.

(3) New or reissued permits, and to the extent allowed under § 144.39 modified or revoked and reissued permits, shall incorporate each of the applicable requirements referenced in § 144.52.

(c) *Incorporation.* All permit conditions shall be incorporated either expressly or by reference. If incorporated by reference, a specific citation to the applicable regulations or requirements must be given in the permit.

[48 FR 14189, Apr. 1, 1983, as amended at 49 FR 20185, May 11, 1984; 53 FR 28147, July 26, 1988]

§ 144.53 Schedule of compliance.

(a) *General.* The permit may, when appropriate, specify a schedule of compliance leading to compliance with the SDWA and Parts 144, 145, 146, and 124.

(1) *Time for compliance.* Any schedules of compliance shall require compliance as soon as possible, and in no case later than 3 years after the effective date of the permit.

(2) *Interim dates.* Except as provided in paragraph (b)(1)(ii) of this section, if a permit establishes a schedule of compliance which exceeds 1 year from the date of permit issuance, the schedule shall set forth interim requirements and the dates for their achievement.

(i) The time between interim dates shall not exceed 1 year.

(ii) If the time necessary for completion of any interim requirement is more than 1 year and is not readily divisible into stages for completion, the permit shall specify interim dates for the submission of reports of progress toward completion of the interim requirements and indicate a projected completion date.

(3) *Reporting.* The permit shall be written to require that if paragraph (a)(1) of this section is applicable, progress reports be submitted no later than 30 days following each interim date and the final date of compliance.

(b) *Alternative schedules of compliance.* A permit applicant or permittee may cease conducting regulated activities (by plugging and abandonment) rather than continue to operate and meet permit requirements as follows:

(1) If the permittee decides to cease conducting regulated activities at a given time within the term of a permit which has already been issued:

(i) The permit may be modified to contain a new or additional schedule leading to timely cessation of activities; or

(ii) The permittee shall cease conducting permitted activities before noncompliance with any interim or final compliance schedule requirement already specified in the permit.

(2) If the decision to cease conducting regulated activities is made before issuance of a permit whose term will include the termination date, the permit shall contain a schedule leading to termination which will ensure timely compliance with applicable requirements.

(3) If the permittee is undecided whether to cease conducting regulated activities, the Director may issue or modify a permit to contain two schedules as follows:

(i) Both schedules shall contain an identical interim deadline requiring a final decision on whether to cease conducting regulated activities no later than a date which ensures sufficient time to comply with applicable requirements in a timely manner if the decision is to continue conducting regulated activities;

(ii) One schedule shall lead to timely compliance with applicable requirements;

(iii) The second schedule shall lead to cessation of regulated activities by a date which will ensure timely compliance with applicable requirements;

(iv) Each permit containing two schedules shall include a requirement that after the permittee has made a final decision under paragraph (b)(3)(i) of this section it shall follow the schedule leading to compliance if the decision is to continue conducting regulated activities, and follow the schedule leading to termination if the decision is to cease conducting regulated activities.

(4) The applicant's or permittee's decision to cease conducting regulated activities shall be evidenced by a firm public commitment satisfactory to the Director, such as a resolution of the board of directors of a corporation.

§ 144.54 Requirements for recording and reporting of monitoring results.

All permits shall specify:

(a) Requirements concerning the proper use, maintenance, and installation, when appropriate, of monitoring equipment or methods (including biological monitoring methods when appropriate);

(b) Required monitoring including type, intervals, and frequency sufficient to yield data which are representative of the monitored activity including when appropriate, continuous monitoring;

(c) Applicable reporting requirements based upon the impact of the regulated activity and as specified in Part 146. Reporting shall be no less frequent than specified in the above regulations.

§ 144.55 Corrective action.

(a) *Coverage.* Applicants for Class I, II, (other than existing), or III injection well permits shall identify the location of all known wells within the injection well's area of review which penetrate the injection zone, or in the case of Class II wells operating over the fracture pressure of the injection formation, all known wells within the area of review penetrating formations affected by the increase in pressure. For such wells which are improperly sealed, completed, or abandoned, the applicant shall also submit a plan consisting of such steps or modifications as are necessary to prevent movement of fluid into underground sources of drinking water ("corrective action"). Where the plan is adequate, the Director shall incorporate it into the permit as a condition. Where the Director's review of an application indicates that the permittee's plan is inadequate (based on the factors in § 146.07), the Director shall require the applicant to revise the plan, prescribe a plan for corrective action as a condition of the permit under paragraph (b) of this section, or deny the application. The Director may disregard the provisions of § 146.06 (Area of Review) and § 146.07 (Corrective Action) when reviewing an application to permit an existing Class II well.

(b) *Requirements*—(1) *Existing injection wells.* Any permit issued for an existing injection well (other than Class II) requiring corrective action shall include a compliance schedule requiring any corrective action accepted or prescribed under paragraph (a) of this section to be completed as soon as possible.

(2) *New injection wells.* No owner or operator of a new injection well may begin injection until all required corrective action has been taken.

(3) *Injection pressure limitation.* The Director may require as a permit condition that injection pressure be so limited that pressure in the injection zone does not exceed hydrostatic pressure at the site of any improperly completed or abandoned well within the area of review. This pressure limitation shall satisfy the corrective action requirement. Alternatively, such injection pressure limitation can be part of a compliance schedule and last until all other required corrective action has been taken.

(4) *Class III wells only.* When setting corrective action requirements the Director shall consider the overall effect of the project on the hydraulic gradient in potentially affected USDWs, and the corresponding changes in potentiometric surface(s) and flow direction(s) rather than the discrete effect of each well. If a decision is

made that corrective action is not necessary based on the determinations above, the monitoring program required in § 146.33(b) shall be designed to verify the validity of such determinations.

Subpart F—Financial Responsibility: Class I Hazardous Waste Injection Wells

SOURCE: 49 FR 20186, May 11, 1984, unless otherwise noted.

§ 144.60 Applicability.

(a) The requirements of §§ 144.62, 144.63, and 144.70 apply to owners and operators of all existing and new Class I Hazardous waste injection wells, except as provided otherwise in this section.

§ 144.61 Definitions of terms as used in this subpart.

(a) "Plugging and abandonment plan" means the plan for plugging and abandonment prepared in accordance with the requirements of § 144.28 and § 144.51.

(b) "Current plugging cost estimate" means the most recent of the estimates prepared in accordance with § 144.62(a), (b) and (c).

(c) "Parent corporation" means a corporation which directly owns at least 50 percent of the voting stock of the corporation which is the injection well owner or operator; the latter corporation is deemed a "subsidiary" of the parent corporation.

(d) The following terms are used in the specifications for the financial test for plugging and abandonment. The definitions are intended to represent the common meanings of the terms as they are generally used by the business community.

"Assets" means all existing and all probable future economic benefits obtained or controlled by a particular entity.

"Current assets" means cash or other assets or resources commonly identified as those which are reasonably expected to be realized in cash or sold or consumed during the normal operating cycle of the business.

"Current liabilities" means obligations whose liquidation is reasonably expected to require the use of existing resources properly classifiable as current assets or the creation of other current liabilities.

"Independently audited" refers to an audit performed by an independent certified public accountant in accordance with generally accepted auditing standards.

"Liabilities" means probable future sacrifices of economic benefits arising from present obligations to transfer assets or provide services to other entities in the future as a result of past transactions or events.

"Net working capital" means current assets minus current liabilities.

"Net worth" means total assets minus total liabilities and is equivalent to owner's equity.

"Tangible net worth" means the tangible assets that remain after deducting liabilities; such assets would not include intangibles such as goodwill and rights to patents or royalties.

§ 144.62 Cost estimate for plugging and abandonment.

(a) The owner or operator must prepare a written estimate, in current dollars, of the cost of plugging the injection well in accordance with the plugging and abandonment plan as specified in §§ 144.28 and 144.51. The plugging and abandonment cost estimate must equal the cost of plugging and abandonment at the point in the facility's operating life when the extent and manner of its operation would making plugging and abandonment the most expensive, as indicated by its plugging and abandonment plan.

(b) The owner or operator must adjust the plugging and abandonment cost estimate for inflation within 30 days after each anniversary of the date on which the first plugging and abandonment cost estimate was prepared. The adjustment must be made as specified in paragraphs (b) (1) and (2) of this section, using an inflation factor derived from the annual Oil and Gas Field Equipment Cost Index. The inflation factor is the result of dividing the latest published annual Index by the Index for the previous year.

(1) The first adjustment is made by multiplying the plugging and aban-

donment cost estimate by the inflation factor. The result is the adjusted plugging and abandonment cost estimate.

(2) Subsequent adjustments are made by multiplying the latest adjusted plugging and abandonment cost estimate by the latest inflation factor.

(c) The owner or operator must revise the plugging and abandonment cost estimate whenever a change in the plugging and abandonment plan increases the cost of plugging and abandonment. The revised plugging and abandonment cost estimate must be adjusted for inflation as specified in § 144.62(b).

(d) The owner or operator must keep the following at the facility during the operating life of the facility: the latest plugging and abandonment cost estimate prepared in accordance with § 144.62 (a) and (c) and, when this estimate has been adjusted in accordance with § 144.62(b), the latest adjusted plugging and abandonment cost estimate.

§ 144.63 Financial assurance for plugging and abandonment.

An owner or operator of each facility must establish financial assurance for the plugging and abandonment of each existing and new Class I hazardous waste injection well. He must choose from the options as specified in paragraphs (a) through (f) of this section.

(a) *Plugging and abandonment trust fund.* (1) An owner or operator may satisfy the requirements of this section by establishing a plugging and abandonment trust fund which conforms to the requirements of this paragraph and submitting an originally signed duplicate of the trust agreement to the Regional Administrator. An owner or operator of a Class I well injecting hazardous waste must submit the originally signed duplicate of the trust agreement to the Regional Administrator with the permit application or for approval to operate under rule. The trustee must be an entity which has the authority to act as a trustee and whose trust operations are regulated and examined by a Federal or State agency.

(2) The wording of the trust agreement must be identical to the wording
specified in § 144.70(a)(1), and t
trust agreement must be accompani
by a formal certification of ackno
edgment (for example,
§ 144.70(a)(2)). Schedule A of the tr
agreement must be updated within
days after a change in the amount
the current plugging and aband
ment cost estimate covered by t
agreement.

(3) Payments into the trust fu
must be made annually by the own
or operator over the term of the init
permit or over the remaining oper
ing life of the injection well as e
mated in the plugging and aband
ment plan, whichever period is sho
er; this period is hereafter referred
as the "pay-in period." The payme
into the plugging and abandonme
trust fund must be made as follows:

(i) For a new well, the first payme
must be made before the initial inj
tion of hazardous waste. A rece
from the trustee for this payme
must be submitted by the owner or
erator to the Regional Administra
before this initial injection of haza
ous waste. The first payment must
at least equal to the current plugg
and abandonment cost estima
except as provided in § 144.70(g), div
ed by the number of years in the p
in period. Subsequent payments m
be made no later than 30 days af
each anniversary date of the first p
ment. The amount of each subseque
payment must be determined by t
formula:

$$\text{Next payment} = \frac{PE - CV}{Y}$$

where PE is the current plugging and ab
donment cost estimate, CV is the curr
value of the trust fund, and Y is the num
of years remaining in the pay-in period.

(ii) If an owner or operator est
lishes a trust fund as specified
§ 144.63(a) of this chapter, and t
value of that trust fund is less th
the current plugging and aband
ment cost estimate when a permit
awarded for the injection well, t
amount of the current plugging
abandonment cost estimate still to
paid into the trust fund must be p

in over the pay-in period as defined in paragraph (a)(3) of this section. Payments must continue to be made no later than 30 days after each anniversary date of the first payment made pursuant to Part 144 of this chapter. The amount of each payment must be determined by this formula:

$$\text{Next payment} = \frac{PE - CV}{Y}$$

where PE is the current plugging and abandonment cost estimate, CV is the current value of the trust fund, and Y is the number of years remaining in the pay-in period.

(4) The owner or operator may accelerate payments into the trust fund or he may deposit the full amount of the current plugging and abandonment cost estimate at the time the fund is established. However, he must maintain the value of the fund at no less than the value that the fund would have if annual payments were made as specified in paragraph (a)(3) of this section.

(5) If the owner or operator establishes a plugging and abandonment trust fund after having used one or more alternate mechanisms specified in this section or in § 144.63 of this chapter, his first payment must be in at least the amount that the fund would contain if the trust fund were established initially and annual payments made according to specifications of this paragraph.

(6) After the pay-in period is completed, whenever the current plugging and abandonment cost estimate changes, the owner or operator must compare the new estimate with the trustee's most recent annual valuation of the trust fund. If the value of the fund is less than the amount of the new estimate, the owner or operator, within 60 days after the change in the cost estimate, must either deposit an amount into the fund so that its value after this deposit at least equals the amount of the current plugging and abandonment cost estimate, or obtain other financial assurance as specified in this section to cover the difference.

(7) If the value of the trust fund is greater than the total amount of the current plugging and abandonment cost estimate, the owner or operator may submit a written request to the Regional Administrator for release of the amount in excess of the current plugging and abandonment cost estimate.

(8) If an owner or operator substitutes other financial assurance as specified in this section for all or part of the trust fund, he may submit a written request to the Regional Administrator for release of the amount in excess of the current plugging and abandonment cost estimate covered by the trust fund.

(9) Within 60 days after receiving a request from the owner or operator for release of funds as specified in paragraph (a)(7) or (8) of this section, the Regional Administrator will instruct the trustee to release to the owner or operator such funds as the Regional Administrator specifies in writing.

(10) After beginning final plugging and abandonment, an owner or operator or any other person authorized to perform plugging and abandonment may request reimbursement for plugging and abandonment expenditures by submitting itemized bills to the Regional Administrator. Within 60 days after receiving bills for plugging and abandonment activities, the Regional Administrator will determine whether the plugging and abandonment expenditures are in accordance with the plugging and abandonment plan or otherwise justified, and if so, he will instruct the trustee to make reimbursement in such amounts as the Regional Administrator specifies in writing. If the Regional Administrator has reason to believe that the cost of plugging and abandonment will be significantly greater than the value of the trust fund, he may withhold reimbursement of such amounts as he deems prudent until he determines, in accordance with § 144.63(i), that the owner or operator is no longer required to maintain financial assurance for plugging and abandonment.

(11) The Regional Administrator will agree to termination of the trust when:

(i) An owner or operator substitutes alternate financial assurance as specified in this section; or

(ii) The Regional Administrator releases the owner or operator from the requirements of this section in accordance with § 144.63(i).

(b) *Surety bond guaranteeing payment into a plugging and abandonment trust fund.* (1) An owner or operator must satisfy the requirements of this section by obtaining a surety bond which conforms to the requirements of this paragraph and submitting the bond to the Regional Administrator with the application for a permit or for approval to operate under rule. The bond must be effective before the initial injection of hazardous waste. The surety company issuing the trust must, at a minimum, be among those listed as acceptable sureties on Federal bonds in Circular 570 of the U.S. Department of the Treasury.

(2) The wording of the surety bond must be identical to the wording in § 144.70(b).

(3) The owner or operator who uses a surety bond to satisfy the requirements of this section must also establish a standby trust fund. Under the terms of the bond, all payments made thereunder will be deposited by the surety directly into the standby trust fund in accordance with instructions from the Regional Administrator. This standby trust fund must meet the requirements specified in § 144.63(a), except that:

(i) An originally signed duplicate of the trust agreement must be submitted to the Regional Administrator with the surety bond; and

(ii) Until the standby trust fund is funded pursuant to the requirements of this section, the following are not required by these requirements:

(A) Payments into the trust fund as specified in § 144.63(a);

(B) Updating of Schedule A of the trust agreement [see § 144.70(a)] to show current plugging and abandonment cost estimates;

(C) Annual valuations as required by the trust agreement; and

(D) Notices of nonpayment as required by the trust agreement.

(4) The bond must guarantee that the owner or operator will:

(i) Fund the standby trust fund in an amount equal to the penal sum of the bond before beginning of plugging and abandonment of the injection well; or

(ii) Fund the standby trust fund in an amount equal to the penal sum within 15 days after an order to begin plugging and abandonment is issued by the Regional Administrator or a U.S. district court or other court of competent jurisdiction; or

(iii) Provide alternate financial assurance as specified in this section, and obtain the Regional Administrator's written approval of the assurance provided, within 90 days after receipt by both the owner or operator and the Regional Administrator of a notice of cancellation of the bond from the surety.

(5) Under the terms of the bond, the surety will become liable on the bond obligation when the owner or operator fails to perform as guaranteed by the bond.

(6) The penal sum of the bond must be in amount at least equal to the current plugging and abandonment cost estimate, except as provided in § 144.63(g).

(7) Whenever the current plugging and abandonment cost estimate increases to an amount greater than the penal sum, the owner or operator, within 60 days after the increase, must either cause the penal sum to be increased to an amount at least equal to the current plugging and abandonment cost estimate and submit evidence of such increase to the Regional Administrator, or obtain other financial assurance as specified in this section to cover the increase. Whenever the current plugging and abandonment cost estimate decreases, the penal sum may be reduced to the amount of the current plugging and abandonment cost estimate following written approval by the Regional Administrator.

(8) Under the terms of the bond, the surety may cancel the bond by sending notice of cancellation by certified mail to the owner or operator and to the Regional Administrator. Cancellation may not occur, however, during 120 days beginning on the date of the receipt of the notice of cancellation by both owner or operator and the Regional Administrator as evidenced by the returned receipts.

(9) The owner or operator may cancel the bond if the Regional Administrator has given prior written consent based on his receipt of evidence of alternate financial assurance as specified in this section.

(c) *Surety bond guaranteeing performance of plugging and abandonment.* (1) An owner or operator may satisfy the requirements of this section by obtaining a surety bond which conforms to the requirements of this paragraph and submitting the bond to the Regional Administrator. An owner or operator of a new facility must submit the bond to the Regional Administrator with the permit application or for approval to operate under rule. The bond must be effective before injection of hazardous waste is started. The surety company issuing the bond must, at [illegible] minimum, be among those listed as acceptable sureties on Federal bonds in Circular 570 of the U.S. Department of the Treasury.

(2) The wording of the surety bond must be identical to the wording specified in § 144.70(c).

(3) The owner or operator who uses a surety bond to satisfy the requirements of this section must also establish a standby trust fund. Under the terms of the bond, all payments made thereunder will be deposited by the surety directly into the standby trust fund in accordance with instructions from the Regional Administrator. The standby trust must meet the requirements specified in § 144.63(a), except that:

(i) An original signed duplicate of the trust agreement must be submitted to the Regional Administrator with the surety bond; and

(ii) Unless the standby trust fund is funded pursuant to the requirements of this section, the following are not required by these regulations:

(A) Payments into the trust fund as specified in § 144.63(a);

(B) Updating of Schedule A of the trust agreement [see § 144.70(a)] to show current plugging and abandonment cost estimates;

(C) Annual valuations as required by the trust agreement; and

(D) Notices of nonpayment as required by the trust agreement.

(4) The bond must guarantee that the owner or operator will:

(i) Perform plugging and abandonment in accordance with the plugging and abandonment plan and other requirements of the permit for the injection well whenever required to do so; or

(ii) Provide alternate financial assurance as specified in this section, and obtain the Regional Administrator's written approval of the assurance provided, within 90 days after receipt by both the owner or operator and the Regional Administrator of a notice of cancellation of the bond from the surety.

(5) Under the terms of the bond, the surety will become liable on the bond obligation when the owner or operator fails to perform as guaranteed by the bond. Following a determination that the owner or operator has failed to perform plugging and abandonment in accordance with the plugging and abandonment plan and other permit requirements when required to do so, under terms of the bond the surety will perform plugging and abandonment as guaranteed by the bond or will deposit the amount of the penal sum into the standby trust fund.

(6) The penal sum of the bond must be in an amount at least equal to the current plugging and abandonment cost estimate.

(7) Whenever the current plugging and abandonment cost estimate increases to an amount greater than the penal sum, the owner or operator, within 60 days after the increase, must either cause the penal sum to be increased to an amount at least equal to the current plugging and abandonment cost estimate and submit evidence of such increase to the Regional Administrator, or obtain other financial assurance as specified in this section. Whenever the plugging and abandonment cost estimate decreases, the penal sum may be reduced to the amount of the current plugging and abandonment cost estimate following written approval by the Regional Administrator.

(8) Under the terms of the bond, the surety may cancel the bond by sending notice of cancellation by certified mail to the owner or operator and to the

Regional Administrator. Cancellation may not occur, however, during the 120 days beginning on the date of receipt of the notice of cancellation by both the owner or operator and the Regional Administrator, as evidenced by the return receipts.

(9) The owner or operator may cancel the bond if the Regional Administrator has given prior written consent. The Regional Administrator will provide such written consent when:

(i) An owner or operator substitute alternate financial assurance as specified in this section; or

(ii) The Regional Administrator releases the owner or operator from the requirements of this section in accordance with § 144.63(i).

(10) The surety will not be liable for deficiencies in the performance of plugging and abandonment by the owner or operator after the Regional Administrator releases the owner or operator from the requirements of this section in accordance with § 144.63(i).

(d) *Plugging and abandonment letter of credit* (1) An owner or operator may satisfy the requirements of this section by obtaining an irrevocable standby letter of credit which conforms to the requirements of this paragraph and submitting the letter to the Regional Administrator. An owner or operator of an injection well must submit the letter of credit to the Regional Administrator during submission of the permit application or for approval to operate under rule. The letter of credit must be effective before initial injection of hazardous waste. The issuing institution must be an entity which has the authority to issue letters of credit and whose letter-of-credit operations are regulated and examined by a Federal or State agency.

(2) The wording of the letter of credit must be identical to the wording specified in § 144.70(d).

(3) An owner or operator who uses a letter of credit to satisfy the requirements of this section must also establish a standby trust fund. Under the terms of the letter of credit, all amounts paid pursuant to a draft by the Regional Administrator will be deposited by the issuing institution directly into the standby trust fund in accordance with instructions from the Regional Administrator. This standby trust fund must meet the requirements of the trust fund specified in § 144.63(a), except that:

(i) An originally signed duplicate o the trust agreement must be submitted to the Regional Administrato with the letter of credit; and

(ii) Unless the standby trust fund i funded pursuant to the requirement of this section, the following are no required by these regulations:

(A) Payments into the trust fund a specified in § 144.63(a);

(B) Updating of Schedule A of th trust agreement (see § 144.70(a)) t show current plugging and abandonment cost estimates;

(C) Annual valuations as required b the trust agreement; and

(D) Notices of nonpayment as r quired by the trust agreement.

(4) The letter of credit must be a companied by a letter from the owne or operator referring to the letter credit by number, issuing institutio and date, and providing the followin information: the EPA Identificatio Number, name, and address of the f cility, and the amount of funds a sured for plugging and abandonmen of the well by the letter of credit.

(5) The letter of credit must be irre ocable and issued for a period of least 1 year. The letter of credit mu provide that the expiration date w be automatically extended for a perio of at least 1 year unless, at least 12 days before the current expiratio date, the issuing institution notifi both the owner or operator and th Regional Administrator by certifie mail of a decision not to extend th expiration date. Under the terms the letter of credit, the 120 days w begin on the date when both th owner or operator and the Region Administrator have received th notice, as evidenced by the return r ceipts.

(6) The letter of credit must b issued in an amount at least equal the current plugging and abando ment cost estimate, except as provid in § 144.63(g).

(7) Whenever the current plugging and abandonment cost estimate increases to an amount greater than the amount of the credit, the owner or operator, within 60 days after the increase, must either cause the amount of the credit to be increased so that it at least equals the current plugging and abandonment cost estimate and submit evidence of such increase to the Regional Administrator, or obtain other financial assurance as specified in this section to cover the increase. Whenever the current plugging and abandonment cost estimate decreases, the amount of the credit may be reduced to the amount of the current plugging and abandonment cost estimate following written approval by the Regional Administrator.

(8) Following a determination that the owner or operator has failed to perform final plugging and abandonment in accordance with the plugging and abandonment plan and other permit requirements when required to do so, the Regional Administrator may draw on the letter of credit.

(9) If the owner or operator does not establish alternate financial assurance as specified in this section and obtain written approval of such alternate assurance from the Regional Administrator within 90 days after receipt by both the owner or operator and the Regional Administrator of a notice from the issuing institution that it has decided not to extend the letter of credit beyond the current expiration date, the Regional Administrator will draw on the letter of credit. The Regional Administrator may delay the drawing if the issuing institution grants an extension of the term of the credit. During the last 30 days of any such extension the Regional Administrator will draw on the letter of credit if the owner or operator has failed to provide alternate financial assurance as specified in this section and obtain written approval of such assurance from the Regional Administrator.

(10) The Regional Administrator will return the letter of credit to the issuing institution for termination when:

(i) An owner or operator substitutes alternate financial assurance as specified in this section; or

(ii) The Regional Administrator releases the owner or operator from the requirements of this section in accordance with § 144.63(i).

(e) *Plugging and abandonment insurance.* (1) An owner or operator may satisfy the requirements of this section by obtaining plugging and abandonment insurance which conforms to the requirements of this paragraph and submitting a certificate of such insurance to the Regional Administrator. An owner or operator of a new injection well must submit the certificate of insurance to the Regional Administrator with the permit application or for approval operate under rule. The insurance must be effective before injection starts. At a minimum, the insurer must be licensed to transact the business of insurance, or eligible to provide insurance as an excess or surplus lines insurer, in one or more States.

(2) The wording of the certificate of insurance must be identical to the wording specified in § 144.70(e).

(3) The plugging and abandonment insurance policy must be issued for a face amount at least equal to the current plugging and abandonment estimate, except as provided in § 144.63(g). The term "face amount" means the total amount the insurer is obligated to pay under the policy. Actual payments by the insurer will not change the face amount, although the insurers future liability will be lowered by the amount of the payments.

(4) The plugging and abandonment insurance policy must guarantee that funds will be available whenever final plugging and abandonment occurs. The policy must also guarantee that once plugging and abandonment begins, the issurer will be responsible for paying out funds, up to an amount equal to the face amount of the policy, upon the direction of the Regional Administrator, to such party or parties as the Regional Administrator specifies.

(5) After beginning plugging and abandonment, an owner or operator or any other person authorized to perform plugging and abandonment may request reimbursement for plugging and abandonment expenditures by submitting itemized bills to the Regional Administrator. Within 60 days

after receiving bills for plugging and abandonment activities, the Regional Administrator will determine whether the plugging and abandonment expenditures are in accordance with the plugging and abandonment plan or otherwise justified, and if so, he will instruct the insurer to make reimbursement in such amounts as the Regional Administrator specifies in writing. If the Regional Administrator has reason to believe that the cost of plugging and abandonment will be significantly greater than the face amount of the policy, he may withhold reimbursement of such amounts as he deems prudent until he determines, in accordance with § 144.63(i), that the owner or operator is no longer required to maintain financial assurance for plugging and abandonment of the injection well.

(6) The owner or operator must maintain the policy in full force and effect until the Regional Administrator consents to termination of the policy by the owner or operator as specified in paragraph (e)(10) of this section. Failure to pay the premium, without substitution of alternate financial assurance as specified in this section, will constitute a significant violation of these regulations, warranting such remedy as the Regional Administrator deems necessary. Such violation will be deemed to begin upon receipt by the Regional Administrator of a notice of future cancellation, termination, or failure to renew due to nonpayment of the premium, rather than upon the date of expiration.

(7) Each policy must contain provisions allowing assignment to a successor owner or operator. Such assignment may be conditional upon consent of the insurer, provided such consent is not unreasonably refused.

(8) The policy must provide that the insurer may not cancel, terminate, or fail to renew the policy except for failure to pay the premium. The automatic renewal of the policy must, at a minimum, provide the insured with the option of renewal at the face amount of the expiring policy. If there is a failure to pay the premium, the insurer may elect to cancel, terminate, or fail to renew the policy by sending notice by certified mail to the owner or operator and the Regional Administrator. Cancellation, termination, or failure to renew may not occur, however, during 120 days beginning with the date of receipt of the notice by both the Regional Administrator and the owner or operator, as evidenced by the return of receipts. Cancellation, termination, or failure to renew may not occur and the policy will remain in full force and effect in the event that on or before the date of expiration:

(i) The Regional Administrator deems the injection well abandoned; or

(ii) The permit is terminated or revoked or a new permit is denied; or

(iii) Plugging and abandonment is ordered by the Regional Administrator or a U.S. district court or other court of competent jurisdiction; or

(iv) The owner or operator is named as debtor in a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code; or

(v) The premium due is paid.

(9) Whenever the current plugging and abandonment cost estimate increases to an amount greater than the face amount of the policy, the owner or operator, within 60 days after the increase, must either cause the face amount to be increased to an amount at least equal to the current plugging and abandonment estimate and submit evidence of such increase to the Regional Administrator, or obtain other financial assurance as specified in this section to cover the increase. Whenever the current plugging and abandonment cost estimate decreases, the face amount may be reduced to the amount of the current plugging and abandonment cost estimate following written approval by the Regional Administrator.

(10) The Regional Administrator will give written consent to the owner or operator that he may terminate the insurance policy when:

(i) An owner or operator substitutes alternate financial assurance as specified in this section; or

(ii) The Regional Administrator releases the owner or operator from the requirements of this section in accordance with § 144.63(i).

(f) *Financial test and corporate guarantee for plugging and abandon-*

ment. (1) An owner or operator may satisfy the requirements of this section by demonstrating that he passes a financial test as specified in this paragraph. To pass this test the owner or operator must meet the criteria of either paragraph (f)(1)(i) or (f)(1)((ii) of this section:

(i) The owner or operator must have:

(A) Two of the following three ratios: A ratio of total liabilities to net worth less than 2.0; a ratio of the sum of net income plus depreciation, depletion, and amortization to total liabilities greater than 0.1; and a ratio of current assets to current liabilities greater than 1.5; and

(B) Net working capital and tangible net worth each at least six times the sum of the current plugging and abandonment cost estimate; and

(C) Tangible net worth of at least $10 million; and

(D) Assets in the United States amounting to at least 90 percent of his total assets or at least six times the sum of the current plugging and abandonment cost estimate.

(ii) The owner or operator must have:

(A) A current rating for his most recent bond issuance of AAA, AA, A or BBB as issued by Standard and Poor's or Aaa, Aa, A, or Baa as issued by Moody's; and

(B) Tangible net worth at least six times the sum of the current plugging and abandonment cost estimate; and

(C) Tangible net worth of at least $10 million; and

(D) Assets located in the United States amounting to at least 90 percent of his total assets or at least six times the sum of the current plugging and abandonment cost estimates.

(2) The phrase "current plugging and abandonment cost estimate" as used in paragraph (f)(1) of this section refers to the cost estimate required to be shown in paragraphs 1 through 4 of the letter from the owner's or operator's chief financial officer § 144.70(f).

(3) To demonstrate that he meets this test, the owner or operator must submit the following items to the Regional Administrator:

(i) A letter signed by the owner's or operator's chief financial officer and worded as specified in § 144.70(f); and

(ii) A copy of the independent certified public accountant's report on examination of the owner's or operator's financial statements for the latest completed fiscal year; and

(iii) A special report from the owner's or operator's independent certified public accountant to the owner or operator stating that:

(A) He has compared the data which the letter from the chief financial officer specifies as having been derived from the independently audited, year-end financial statements for the latest fiscal year with the amounts in such financial statements; and

(B) In connection with that procedure, no matters came to his attention which caused him to believe that the specified data should be adjusted.

(4) An owner or operator of a new injection well must submit the items specified in paragraph (f)(3) of this section to the Regional Administrator within 90 days after the close of each succeeding fiscal year. This information must consist of all three items specified in paragraph (f)(3) of this section.

(5) After the initial submission of items specified in paragraph (f)(3) of this section, the owner or operator must send updated information to the Regional Administrator within 90 days after the close of each succeeding fiscal year. This information must consist of all three items specified in paragraph (f)(3) of this section.

(6) If the owner or operator no longer meets the requirements of paragraph (f)(1) of this section, he must send notice to the Regional Administrator of intent to establish alternate financial assurance as specified in this section. The notice must be sent by certified mail within 90 days after the end of the fiscal year for which the year-end financial data show that the owner or operator no longer meets the requirements. The owner or operator must provide the alternate financial assurance within 120 days after the end of such fiscal year.

(7) The Regional Administrator may, based on a reasonable belief that the owner or operator may no longer meet the requirements of paragraph (f)(1) of this section, require reports of financial condition at any time from

the owner or operator in addition to those specified in paragraph (f)(3) of this section. If the Regional Administrator finds, on the basis of such reports or other information, that the owner or operator no longer meets the requirements of paragraph (f)(1) of this section, the owner or operator must provide alternate financial assurance as specified in this section within 30 days after notification of such a finding.

(8) The Regional Administrator may disallow use of this test on the basis of qualifications in the opinion expressed by the independent certified public accountant in his report on examination of the owner's or operator's financial statements [see paragraph (f)(3)(ii) of this section]. An adverse opinion or disclaimer of opinion will be cause for disallowance. The Regional Administrator will evaluate other qualifications on an individual basis. The owner or operator must provide alternate financial assurance as specified in this section within 30 days after notification of the disallowance.

(9) The owner or operator is no longer required to submit the items specified in paragraph (f)(3) of this section when:

(i) An owner or operator substitutes alternate financial assurance as specified in this section; or

(ii) The Regional Administrator releases the owner or operator from the requirements of this section in accordance with § 144.63(i).

(10) An owner or operator may meet the requirements of this section by obtaining a written guarantee, hereafter referred to as "corporate guarantee." The guarantee must be the parent corporation of the owner or operator. The guarantee must meet the requirements for owners or operators in paragraphs (f)(1) through (f)(8) of this section and must comply with the terms of the corporate guarantee. The wording of the corporate guarantee must be identical to the wording specified in § 144.70(h). The corporate guarantee must accompany the items sent to the Regional Administrator as specified in paragraph (f)(3) of this section. The terms of the corporate guarantee must provide that:

(i) If the owner or operator fails to perform plugging and abandonment of the injection well covered by the corporate guarantee in accordance with the plugging and abandonment plan and other permit requirements whenever required to do so, the guarantee will do so or establish a trust fund as specified in § 144.63(a) in the name of the owner or operator.

(ii) The corporate guarantee will remain in force unless the guarantor sends notice of cancellation by certified mail to the owner or operator and the Regional Administrator, as evidenced by the return receipts. Cancellation may not occur, however, during the 120 days beginning on the date of receipt of the notice of cancellation by both the owner or operator and the Regional Administrator, as evidenced by the return receipts.

(iii) If the owner or operator fails to provide alternate financial assurance as specified in this section and obtain the written approval of such alternate assurance from the Regional Administrator within 90 days after receipt by both the owner or operator and the Regional Administrator of a notice of cancellation of the corporate guarantee from the guarantor, the guarantor will provide such alternative financial assurance in the name of the owner or operator.

(g) *Use of multiple financial mechanisms.* An owner or operator may satisfy the requirements of this section by establishing more than one financial mechanism per injection well. These mechanisms are limited to trust funds, surety bonds, guaranteeing payment into a trust fund, letters of credit, and insurance. The mechanisms must be as specified in paragraphs (a), (b), (d), and (e), respectively, of this section, except that it is the combination of mechanisms, rather than the single mechanism, which must provide financial assurance for an amount at least equal to the adjusted plugging and abandonment cost. If an owner or operator uses a trust fund in combination with a surety bond or letter of credit, he may use that trust fund as the standby trust fund for the other mechanisms. A single standby trust may be established for two or more mechanisms. The Regional Administrator may invoke any or all of the mechanisms to provide for plugging and abandonment of the injection well.

(h) *Use of a financial mechanism for multiple facilities.* An owner or operator may use a financial assurance mechanism specified in this section to meet the requirements of this section for more than one injection well. Evidence of financial assurance submitted to the Regional Administrator must include a list showing, for each injection well, the EPA Identification Number, name, address, and the amount of funds for plugging and abandonment assured by the mechanism. If the injection wells covered by the mechanism are in more than one Region, identical evidence of financial assurance must be submitted to and maintained with the Regional Administrators of all such Regions. The amount of funds available through the mechanism must be no less than the sum of funds that would be available if a separate mechanism had been established and maintained for each injection well. In directing funds available through the mechanism for plugging and abandonment of any of the injection wells covered by the mechanism, the Regional Administrator may direct only the amount of funds designated for that injection well, unless the owner or operator agrees to use additional funds available under the mechanism.

(i) *Release of the owner or operator from the requirements of this section.* Within 60 days after receiving certifications from the owner or operator and an independent registered professional engineer that plugging and abandonment has been accomplished in accordance with the plugging and abandonment plan, the Regional Administrator will notify the owner or operator in writing that he is no longer required by this section to maintain financial assurance for plugging and abandonment of the injection well, unless the Regional Administrator has reason to believe that plugging and abandonment has not been in accordance with the plugging and abandonment plan.

§ 144.64 Incapacity of owners or operators, guarantors, or financial institutions.

(a) An owner or operator must notify the Regional Administrator by certified mail of the commencement of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming the owner or operator as debtor, within 10 business days after the commencement of the proceeding. A guarantor of a corporate guarantee as specified in § 144.63(f) must make such a notification if he is named as debtor, as required under the terms of the guarantee (§ 144.70(f)).

(b) An owner or operator who fulfills the requirements of § 144.63 by obtaining a letter of credit, surety bond, or insurance policy will be deemed to be without the required financial assurance or liability coverage in the event of bankruptcy, insolvency, or a suspension or revocation of the license or charter of the issuing institution. The owner or operator must establish other financial assurance or liability coverage within 60 days after such an event.

§ 144.65 Use of State-required mechanisms.

(a) For a facility located in a State where EPA is administering the requirements of this subpart but where the State has plugging and abandonment regulations that include requirements for financial assurance of plugging and abandonment, an owner or operator may use State-required financial mechanisms to meet the requirements of this subpart if the Regional Administrator determines that the State mechanisms are at least equivalent to the mechanisms specified in this subpart. The Regional Administrator will evaluate the equivalency of the mechanisms mainly in terms of (1) certainty of the availability of funds for the required plugging and abandonment activities and (2) the amount of funds that will be made available. The Regional Administrator may also consider other factors. The owner or operator must submit to the Regional Administrator evidence of the establishment of the mechanism together with a letter requesting that the

State-required mechanism be considered acceptable for meeting the requirements of this subpart. The submittal must include the following information: The facility's EPA Identification Number, name and address, and the amounts of funds for plugging and abandonment coverage assured by the mechanism. The Regional Administrator will notify the owner or operator of his determination regarding the mechanism's acceptability. The Regional Administrator may require the owner or operator to submit additional information as is deemed necessary for making this determination.

(b) If a State-required mechanism is found acceptable as specified in paragraph (a) of this section except for the amount of funds available, the owner or operator may satisfy the requirements of this subpart by increasing the funds available through the State-required mechanism or using additional mechanisms as specified in this subpart. The amounts of funds available through the State and Federal mechanisms must at least equal the amounts required by this subpart.

§ 144.66 State assumption of responsibility.

(a) If a State either assumes legal responsibility for an owner's or operator's compliance with the plugging and abandonment requirements of these regulations or assures that funds will be available from State sources to cover these requirements, the owner or operator will be in compliance with the requirements of this subpart if the Regional Administrator determines that the State's assumption of responsibility is at least equivalent to the mechanisms specified in this subpart. The Regional Administrator will evaluate the equivalency of State guarantees mainly in terms of (1) certainty of the availability of funds for the required plugging and abandonment coverage and (2) the amount of funds that will be made available. The Regional Administrator may also consider other factors. The owner or operator must submit to the Regional Administrator a letter from the State describing the nature of the State's assumption of responsibility together with a letter from the owner or operator requesting that the State's asumption of responsibility be considered acceptable for meeting the requirements of this subpart. The letter from the State must include, or have attached to it, the following information: the facility's EPA Identification Number name and address, and the amounts of funds for plugging and abandonment coverage that are guaranteed by the State. The Regional Administrator will notify the owner or operator o his determination regarding the acceptability of the State's guarantee i lieu of mechanisms specified in thi subpart. The Regional Administrato may require the owner or operator t submit additional information as i deemed necessary to make this deter mination. Pending this determinatio the owner or operator will be deeme to be in compliance with § 144.63.

(b) If a State's assumption of respon sibility is found acceptable as specifie in paragraph (a) of this section excep for the amount of funds available, th owner or operator may satisfy the r quirements of this subpart by use o both the State's assurance and add tional financial mechanisms as spec fied in this subpart. The amount o funds available through the State an Federal mechanisms must at lea equal the amount required by this sub part.

§ 144.70 Wording of the instruments.

(a)(1) A trust agreement for a tru fund, as specified in § 144.63(a) of th chapter, must be worded as follow except that instructions in bracke are to be replaced with the relevant i formation and the brackets deleted:

TRUST AGREEMENT

TRUST AGREEMENT, the "Agreemen entered into as of [date] by and betwe [name of the owner or operator], a [name State] [insert "corporation," "partnershi "association," or "proprietorship"], t "Grantor," and [name of corporate truste [insert "incorporated in the State of — or "a national bank"], the "Trustee."

Whereas, the United States Environme tal Protection Agency, "EPA," an agency the United States Government, has est lished certain regulations applicable to t Grantor, requiring that an owner or ope tor of an injection well shall provide as ance that funds will be available wh needed for plugging and abandonment of the injection well,

Whereas, the Grantor has elected to establish a trust to provide all or part of such financial assurance for the facility(ies) identified herein,

Whereas, the Grantor, acting through its duly authorized officers, has selected the Trustee to be the trustee under this agreement, and the Trustee is willing to act as trustee,

Now, therefore, the Grantor and the Trustee agree as follows:

Section 1. Definitions. As used in this Agreement:

(a) The term "Grantor" means the owner or operator who enters into this Agreement and any successors or assigns of the Grantor.

(b) The term "Trustee" means the Trustee who enters into this Agreement and any successor Trustee.

(c) Facility or activity means any "underground injection well" or any other facility or activity that is subject to regulation under the Underground Injection Control Program.

Section 2. Identification of Facilities and Cost Estimates. This Agreement pertains to the facilities and cost estimates identified on attached Schedule A [on Schedule A, for each facility list the EPA Identification Number, name, address, and the current plugging and abandonment cost estimate, or portions thereof, for which financial assurance is demonstrated by this Agreement].

Section 3. Establishment of Fund. The Grantor and the Trustee hereby establish a trust fund, the "Fund," for the benefit of EPA. The Grantor and the Trustee intend that no third party have access to the Fund except as herein provided. The Fund is established initially as consisting of the property, which is acceptable to the Trustee, described in Schedule B attached hereto. Such property and any other property subsequently transferred to the Trustee is referred to as the Fund, together with all earnings and profits thereon, less any payments or distributions made by the Trustee pursuant to this Agreement. The Fund shall be held by the Trustee, IN TRUST, as hereinafter provided. The Trustee shall not be responsible nor shall it undertake any responsibility for the amount or adequacy of, nor any duty to collect from the Grantor, any payments necessary to discharge any liabilities of the Grantor established by EPA.

Section 4. Payment for Plugging and Abandonment. The Trustee shall make payments from the Fund as the EPA Regional Administrator shall direct, in writing, to provide for the payment of the costs of plugging and abandonment of the injection wells covered by this Agreement. The Trustee shall reimburse the Grantor or other persons as specified by the EPA Regional Administrator from the Fund for plugging and abandonment expenditures in such amounts as the EPA Regional Administrator shall direct in writing. In addition, the Trustee shall refund to the Grantor such amounts as the EPA Regional Administrator specifies in writing. Upon refund, such funds shall no longer constitute part of the Fund as defined herein.

Section 5. Payments Comprising the Fund. Payments made to the Trustee for the Fund shall consist of cash or securities acceptable to the Trustee.

Section 6. Trustee Management. The Trustee shall invest and reinvest the principal and income of the Fund and keep the Fund invested as a single fund, without distinction between principal and income, in accordance with general investment policies and guidelines which the Grantor may communicate in writing to the Trustee from time to time, subject, however, to the provisions of this Section. In investing, reinvesting, exchanging, selling, and managing the Fund, the Trustee shall discharge his duties with respect to the trust fund solely in the interest of the beneficiary and with the care, skill, prudence, and diligence under the circumstances then prevailing which persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of an enterprise of a like character and with like aims; *except that*:

(i) Securities or other obligations of the Grantor, or any other owner or operator of the facilities, or any of their affiliates as defined in the Investment Company Act of 1940, as amended, 15 U.S.C. 80a-2.(a), shall not be acquired or held, unless they are securities or other obligations of the Federal or a State government;

(ii) The Trustee is authorized to invest the Fund in time or demand deposits of the Trustee, to the extent insured by an agency of the Federal or State government; and

(iii) The Trustee is authorized to hold cash awaiting investment or distribution uninvested for a reasonable time and without liability for the payment of interest thereon.

Section 7. Commingling and Investment. The Trustee is expressly authorized in its discretion:

(a) To transfer from time to time any or all of the assets of the Fund to any common, commingled, or collective trust fund created by the Trustee in which the Fund is eligible to participate, subject to all of the provisions thereof, to be commingled with the assets of other trusts participating therein; and

(b) To purchase shares in any investment company registered under the Investment Company Act of 1940, 15 U.S.C. 80a-1 et seq., including one which may be created, managed, underwritten, or to which investment advice is rendered or the shares of which are sold by the Trustee. The Trustee may vote shares in its discretion.

Section 8. Express Powers of Trustee. Without in any way limiting the powers and discretions conferred upon the Trustee by the other provisions of this Agreement or by law, the Trustee is expressly authorized and empowered:

(a) To sell, exchange, convey, transfer, or otherwise dispose of any property held by it, by public or private sale. No person dealing with the Trustee shall be bound to see to the application of the purchase money or to inquire into the validity or expediency of any such sale or other disposition;

(b) To make, execute, acknowledge, and deliver any and all documents of transfer and conveyance and any and all other instruments that may be necessary or appropriate to carry out the powers herein granted;

(c) To register any securities held in the Fund in its own name or in the name of a nominee and to hold any security in bearer form or in book entry, or to combine certificates representing such securities with certificates of the same issue held by the Trustee in other fiduciary capacities, or to deposit or arrange for the deposit of such securities in a qualified central depository even though, when so deposited, such securities may be merged and held in bulk in the name of the nominee of such depositary with other securities deposited therein by another person, or to deposit or arrange for the deposit of any securities issued by the United States Government, or any agency or instrumentality thereof, with a Federal Reserve bank, but the books and records of the Trustee shall at all times show that all such securities are part of the Fund;

(d) To deposit any cash in the Fund in interest-bearing accounts maintained or savings certificates issued by the Trustee, in its separate corporate capacity, or in any other banking institution affiliated with the Trustee, to the extent insured by an agency of the Federal or State government; and

(e) To compromise or otherwise adjust all claims in favor of or against the Fund.

Section 9. Taxes and Expenses. All taxes of any kind that may be assessed or levied against or in respect of the Fund and all brokerage commissions incurred by the Fund shall be paid from the Fund. All other expenses incurred by the Trustee in connection with the administration of this Trust, including fees for legal services rendered to the Trustee, the compensation of the Trustee to the extent not paid directly by the Grantor, and all other proper charges and disbursements of the Trustee shall be paid from the Fund.

Section 10. Annual Valuation. The Trustee shall annually, at least 30 days prior to the anniversary date of establishment of the Fund, furnish to the Grantor and to the appropriate EPA Regional Administrator a statement confirming the value of the Trust. Any securities in the Fund shall be valued at market value as of no more than 60 days prior to the anniversary date of establishment of the Fund. The failure of the Grantor to object in writing to the Trustee within 90 days after the statement has been furnished to the Grantor and the EPA Regional Administrator shall constitute a conclusively binding assent by the Grantor, barring the Grantor from asserting any claim or liability against the Trustee with respect to matters disclosed in the statement.

Section 11. Advice of Counsel. The Trustee may from time to time consult with counsel, who may be counsel to the Grantor, with respect to any question arising as to the construction of this Agreement of any action to be taken hereunder. The Trustee shall be fully protected, to the extent permitted by law, in acting upon the advice of counsel.

Section 12. Trustee Compensation. The Trustee shall be entitled to reasonable compensation for its services as agreed upon in writing from time to time with the Grantor.

Section 13. Successor Trustee. The Trustee may resign or the Grantor may replace the Trustee, but such resignation or replacement shall not be effective until the Grantor has appointed a successor trustee and this successor accepts the appointment. The successor trustee shall have the same powers and duties as those conferred upon the Trustee hereunder. Upon the successor trustee's acceptance of the appointment, the Trustee shall assign, transfer, and pay over to the successor trustee the funds and properties then constituting the Fund. If for any reason the Grantor cannot or does not act in the event of the resignation of the Trustee, the Trustee may apply to a court of competent jurisdiction for the appointment of a successor trustee or for instructions. The successor trustee shall specify the date on which it assumes administration of the trust in a writing sent to the Grantor, the EPA Regional Administrator, and the present Trustee by certified mail 10 days before such change becomes effective. Any expenses incurred by the Trustee as a result of any of the acts contemplated by this Section shall be paid as provided in Section 9.

Section 14. Instructions to the Trustee. All orders, requests, and instructions by the Grantor to the Trustee shall be in writing, signed by such persons as are designated in the attached Exhibit A or such other designees as the Grantor may designate by amendment to Exhibit A. The Trustee shall be fully protected in acting without inquiry in accordance with the Grantor's orders, requests, and instructions. All orders, requests, and instructions by the EPA Region-

l Administrator to the Trustee shall be in
riting, signed by the EPA Regional Admin-
strators of the Regions in which the facili-
es are located, or their designees, and the
rustee shall act and shall be fully protect-
d in acting in accordance with such orders,
equests, and instructions. The Trustee
hall have the right to assume, in the ab-
ence of written notice to the contrary, that
o event constituting a change or a termina-
on of the authority of any person to act on
ehalf of the Grantor or EPA hereunder
as occurred. The Trustee shall have no
uty to act in the absence of such orders, re-
uests, and instructions from the Grantor
nd/or EPA, except as provided for herein.

Section 15. Notice of Nonpayment. The
rustee shall notify the Grantor and the
ppropriate EPA Regional Administrator,
y certified mail within 10 days following
ne expiration of the 30-day period after the
nniversary of the establishment of the
rust, if no payment is received from the
rantor during that period. After the pay-
 period is completed, the Trustee shall not
e required to send a notice of nonpayment.

Section 16. Amendment of Agreement. This
greement may be amended by an instru-
ent in writing executed by the Grantor,
e Trustee, and the appropriate EPA Re-
onal Administrator, or by the Trustee and
e appropriate EPA Regional Administra-
r if the Grantor ceases to exist.

*Section 17. Irrevocability and Termina-
on.* Subject to the right of the parties to
mend this Agreement as provided in Sec-
on 16, this Trust shall be irrevocable and
all continue until terminated at the writ-
n agreement of the Grantor, the Trustee,
d the EPA Regional Administrator, or by
e Trustee and the EPA Regional Adminis-
ator if the Grantor ceases to exist. Upon
rmination of the Trust, all remaining
ust property, less final trust administra-
on expenses, shall be delivered to the
rantor.

*Section 18. Immunity and Indemnifica-
on.* The Trustee shall not incur personal
ability of any nature in connection with
ny act or omission, made in good faith, in
e administration of this Trust, or in carry-
g out any directions by the Grantor or the
PA Regional Administrator issued in ac-
rdance with this Agreement. The Trustee
all be indemnified and saved harmless by
e Grantor or from the Trust Fund, or
oth, from and against any personal liabil-
y to which the Trustee may be subjected
y reason of any act or conduct in its offi-
al capacity, including all expenses reason-
bly incurred in its defense in the event the
rantor fails to provide such defense.

Section 19. Choice of Law. This Agree-
ent shall be administered, construed, and
nforced according to the laws of the State
f [insert name of State].

Section 20. Interpretation. As used in this Agreement, words in the singular include the plural and words in the plural include the singular. The descriptive headings for each Section of this Agreement shall not affect the interpretation or the legal efficacy of this Agreement.

In Witness Whereof the parties have caused this Agreement to be executed by their respective officers duly authorized and their corporate seals to be hereunto affixed and attested as of the date first above written. The parties below certify that the wording of this Agreement is identical to the wording specified in 40 CFR Part 144.70(a)(1) as such regulations were constituted on the date first above written.

[Signature of Grantor]
By [Title]
Attest:

[Title]

[Seal]

[Signature of Trustee]
By
Attest:

[Title]

[Seal]

(2) The following is an example of the certification of acknowledgment which must accompany the trust agreement for a trust fund as specified in § 144.63(a). State requirements may differ on the proper content of this acknowledgment.

State of ———————————
County of ———————————

On this [date], before me personally came [owner or operator] to me known, who, being by me duly sworn, did depose and say that she/he resides at [address], that she/he is [title] of [corporation], the corporation described in and which executed the above instrument; that she/he knows the seal of said corporation; that the seal affixed to such instrument is such corporate seal; that it was so affixed by order to the Board of Directors of said corporation, and that she/he signed her/his name thereto by like order.

[Signature of Notary Public]

(b) A surety bond guaranteeing payment into a trust fund, as specified in § 144.63 of this chapter, must be worded as follows, except that instructions in brackets are to be replaced with the relevant information and the brackets deleted:

FINANCIAL GUARANTEE BOND

Dated bond executed: ——————

Effective date: ——————

Principal: [legal name and business address of owner or operator].

Type of organization: [insert "individual," "joint venture," "partnership," or "corporation"].

State of incorporation: ——————

Surety(ies): [name(s) and business address(es)].

EPA Identification Number, name, address, and plugging and abandonment amount(s) for each facility guaranteed by this bond [indicate plugging and abandonment amounts separately]: ———

Total penal sum of bond: $———

Surety's bond number: ———

Know All Persons By These Presents, That we, the Principal and Surity(ies) hereto are firmly bound to the U.S. Environmental Protection Agency (hereinafter called EPA), in the above penal sum for the payment of which we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally; provided that, where the Surety(ies) are corporations acting as co-surties, we, the Sureties, bind ourselves in such sum "jointly and severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety, but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sum.

Whereas said Principal is required, under the Underground Injection Control Regulations (UIC), to have a permit or comply with requirements to operate under rule in order to own or operate each injection well identified above, and

Whereas said Principal is required to provide financial assurance for plugging and abandonment as a condition of the permit or provisions to operate under rule, and

Whereas said Principal shall establish a standby trust fund as is required when a surety bond is used to provide such financial assurance;

Now, therefore, the conditions of the obligation are such that if the Principal shall faithfully, before the beginning of plugging and abandonment of each injection well identified above, fund the standby trust fund in the amount(s) identified above for the injection well,

Or if the Principal shall fund the standby trust fund in such amount(s) within 15 days after an order to begin plugging and abandonment is issued by an EPA Regional Administrator or a U.S. district court or other court of competent jurisdiction,

Or, if the Principal shall provide alternate financial assurance, as specified in Subpart F of 40 CFR Part 144, as applicable, and obtain the EPA Regional Administrator's written approval of such assurance, within 90 days after the date of notice of cancellation is received by both the Principal and the EPA Regional Administrator(s) from the Surety(ies), then this obligation shall be null and void, otherwise it is to remain in full force and effect.

The Surety(ies) shall become liable on this bond obligation only when the Principal has failed to fulfill the conditions described above. Upon notification by an EPA Regional Administrator that the Principal has failed to perform as guaranteed by this bond, the Surety(ies) shall place funds in the amount guaranteed for the injection well(s) into the standby trust funds as directed by the EPA Regional Administrator.

The liability of the Surety(ies) shall not be discharged by any payment or succession of payments hereunder, unless and until such payment or payments shall amount in the aggregate to the penal sum of the bond, but in no event shall the obligation of the Surety(ies) hereunder exceed the amount of said penal sum.

The Surety(ies) may cancel the bond by sending notice of cancellation by certified mail to the Principal and to the EPA Regional Administrator(s) for the Region(s) in which the injection well(s) is (are) located, provided, however, that that cancellation shall not occur during the 120 days beginning on the date of receipt of the notice of cancellation by both the Principal and the EPA Regional Administrator(s), as evidenced by the return receipts.

The Principal may terminate this bond by sending written notice to the Surety(ies), provided, however, that no such notice shall become effective until the Surety(ies) receive(s) written authorization for termination of the bond by the EPA Regional Administrator(s) of the Region(s) in which the bonded facility(ies) is (are) located.

[The following paragraph is an optional rider that may be included but is not required.]

Principal and Surety(ies) hereby agree to adjust the penal sum of the bond yearly so that it guarantees a new plugging and abandonment amount, provided that the penal sum does not increase by more than 20 percent in any one year, and no decrease in the penal sum takes place without the written permission of the EPA Regional Administrator(s).

In Witness Whereof, the Principal and Surety(ies) have executed this Financial Guarantee Bond and have affixed their seals on the date set forth above.

The persons whose signatures appear below hereby certify that they are authorized to execute this surety bond on behalf of the Principal and Surety(ies) and that the wording of this surety bond is identical to the wording specified in 40 CFR 144.70(b) as such regulations were constituted on the date this bond was executed.

Principal

[Signature(s)]
[Name(s)]
[Title(s)]
[Corporate seal]

Corporate Surety(ies)

[Name and address]
State of incorporation: ———.
Liability limit: $———.
[Signature(s)]
[Name(s) and title(s)]
[Corporate seal]
[For every co-surety, provide signature(s), corporate seal, and other information in the same manner as for Surety above.]
Bond premium: $———.

(c) A surety bond guaranteeing performance of plugging and abandonment, as specified in § 144.63(c), must be worded as follows, except that the instructions in brackets are to be replaced with the relevant information and the brackets deleted:

PERFORMANCE BOND

Date bond executed: ———.
Effective date: ———.
Principal: [legal name and business address of owner or operator].
Type of organization: [insert "individual," "joint venture," "partnership," or "corporation"].
State of incorporation: ———.
Surety(ies): [name(s) and business address(es)]

______

EPA Identification Number, name, address, and plugging and abandonment amounts(s) for each injection well guaranteed by this bond [indicate plugging and abandonment amounts for each well]:

______

Total penal sum of bond: $———.
Surety's bond number: ———.

Know All Persons By These Presents, That We, the Principal and Surety(ies) hereto are firmly bound to the U.S. Environmental Protection Agency [hereinafter called EPA], in the above penal sum for the payment of which we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally; provided that, where the Surety(ies) are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety, but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sum.

Whereas said Principal is required, under the Undergound Injection Control Regulations, as amended, to have a permit or comply with provisions to operate under rule for each injection well identified above, and

Whereas said Principal is required to provide financial assurance for plugging and abandonment as a condition of the permit or approval to operate under rule, and

Whereas said Principal shall establish a standby trust fund as is required when a surety bond is used to provide such financial assurance;

Now, Therefore, the conditions of this obligation are such that if the Principal shall faithfully perform plugging and abandonment, whenever required to do so, of each injection well for which this bond guarantees plugging and abandonment, in accordance with the plugging and abandonment plan and other rquirements of the permit or provisions for operating under rule and other requirements of the permit or provisions for operating under rule as may be amended, pursuant to all applicable laws, statutes, rules and regulations, as such laws, statutes, rules, and regulations may be amended,

Or, if the Principal shall provide alternate financial assurance as specified in Subpart F of 40 CFR Part 144, and obtain the EPA Regional Administrator's written approval of such assurance, within 90 days after the date of notice of cancellation is received by both the Principal and the EPA Regional Administrator(s) from the Surety(ies), then this obligation shall be null and void, otherwise it is to remain in full force and effect.

The Surety(ies) shall become liable on this bond obligation only when the Principal has failed to fulfill the conditions described above.

Upon notification by an EPA Regional Administrator that the Principal has been found in violation of the plugging and abandonment requirements of 40 CFR Part 144, for an injection well which this bond guarantees performances of plugging and abandonment, the Surety(ies) shall either perform plugging and abandonment in accordance with the plugging and abandonment plan and other permit requirements or provisions for operating under rule and other requirements or place the amount for plugging and abandonment into a standby trust fund as directed by the EPA Regional Administrator.

Upon notification by an EPA Regional Administrator that the Principal has failed to provide alternate financial assurance as specified in Subpart F of 40 CFR Part 144, and obtain written approval of such assurance from the EPA Regional Administrator(s) during the 90 days following receipt by both the Principal and the EPA Regional Administrator(s) of a notice of cancellation of the bond, the Surety(ies) shall place funds in the amount guaranteed for the injection well(s) into the standby trust fund as directed by the EPA Regional Administrator.

The surety(ies) hereby waive(s) notification of amendments to plugging and abandonment plans, permits, applicable laws, statutes, rules, and regulations and agrees that no such amendment shall in any way alleviate its (their) obligation on this bond.

The liability of the Surety(ies) shall not be discharged by any payment or succession of payments hereunder, unless and until such payment or payments shall amount in the aggregate to the penal sum of the bond, but in no event shall the obligation of the Surety(ies) hereunder exceed the amount of said penal sum.

The Surety(ies) may cancel the bond by sending notice by certified mail to the owner or operator and to the EPA Regional Administrator(s) for the Region(s) in which the injection well(s) is (are) located, provided, however, that cancellation shall not occur during the 120 days beginning on the date of receipt of the notice of cancellation by both the Principal and the EPA Regional Administrator(s), as evidenced by the return receipts.

The principal may terminate this bond by sending written notice to the Surety(ies), provided, however, that no such notice shall become effective until the Surety(ies) receive(s) written authorization for termination of the bond by the EPA Regional Administrator(s) of the EPA Region(s) in which the bonded injection well(s) is (are) located.

[The following paragraph is an optional rider that may be included but is not required.]

Principal and Surety(ies) hereby agree to adjust the penal sum of the bond yearly so that it guarantees a new plugging and abandonment amount, provided that the penal sum does not increase by more than 20 percent in any one year, and no decrease in the penal sum takes place without the written permission of the EPA Regional Administrator(s).

In Witness Whereof, The Principal and Surety(ies) have executed this Performance Bond and have affixed their seals on the date set forth above.

The persons whose signatures appear below hereby certify that they are authorized to execute this surety bond on behalf of the Principal and Surety(ies) and that the wording on this surety bond is identical to the wording specified in 40 CFR 144.70(c) as such regulation was constituted on the date this bond was executed.

Principal.
[Signature(s)]
[Name(s)]
[Title(s)]
[Corporate seal]
[Corporate Surety(ies)]
[Name and address]
State of incorporation:

Liability limit: $———.
[Signature(s)]
[Name(s) and title(s)]
Corporate seal:

[For every co-surety, provide signature(s), corporate seal, and other information in the same manner as for Surety above.]

Bond premium: $————.

(d) A letter of credit, as specified in § 144.63(d) of this chapter, must be worded as follows, except that instructions in brackets are to be replaced with the relevant information and the brackets deleted:

IRREVOCABLE STANDBY LETTER OF CREDIT

Regional Administrator(s)
Region(s) ————————
U.S. Environmental Protection Agency.

Dear Sir or Madam:

We hereby establish our Irrevocable Standby Letter of Credit No. —— in your favor, at the request and for the account of [owner's or operator's name and address] up to the aggregate amount of [in words] U.S. dollars $———, available upon presentation [insert, if more than one Regional Administrator is a beneficiary, "by any one of you"] of

(1) Your sight draft, bearing reference to this letter of credit No. ———, and

(2) Your signed statement reading as follows: "I certify that the amount of the draft is payable pursuant to regulations issued under authority of the Safe Drinking Water Act."

This letter of credit is effective as of [date] and shall expire on [date at least 1 year later], but such expiration date shall be automatically extended for a peroid of [at least 1 year] on [date] and on each successive expiration date, unless, at least 120 days before the current expiration date, we notify both you and [owner's or operator's name] by certified mail that we have decided not to extend this letter of credit beyond the current expiration date. In the event u are so notified, any unused portion of e credit shall be available upon presentaon of your sight draft for 120 days after e date of receipt by both you and [owner's operator's name], as shown on the signed turn receipts.

Whenever this letter of credit is drawn on ider and in compliance with the terms of is credit, we shall duly honor such draft pon presentation to us, and we shall deposthe amount of the draft directly into the andby trust fund of [owner's or operator's ame] in accordance with your instructions.

We certify that the wording of this letter credit is identical to the wording specified 40 CFR 144.70(d) as such regulations ere constituted on the date shown immediely below.

Signature(s) and title(s) of official(s) of isuing institution]

Date]

This credit is subject to [insert "the most ecent edition of the Uniform Customs and ractice for Documentary Credits, pubshed by the International Chamber of ommerce," or "the Uniform Commercial ode"].

(e) A certificate of insurance, as pecified in § 144.63(e) of this chapter, ust be worded as follows, except that nstructions in brackets are to be relaced with the relevant information nd the brackets deleted:

Certificate of Insurance for Plugging and bandonment

Name and Address of Insurer (herein alled the "insurer"):

____

Name and Address of Insurer (herein alled the "insurer"):

____

Injection Wells covered: [list for each vell: The EPA Identification Number, name, address, and the amount of insurance for plugging and abandonment (these amounts for all injection wells covered must total the face amount shown below).]

Face Amount: ______________________

Policy Number: ____________________

Effective Date: ____________________

The insurer hereby certifies that it has issued to the Insured the policy of insurance identified above to provide financial assurance for plugging and abandonment for the injection wells identified above. The Insurer further warrants that such policy conforms in all respects with the requirements of 40 CFR 144.63(e), as applicable and as such regulations were constituted on the date shown immediately below. It is agreed that any provision of the policy inconsistent with such regulations is hereby amended to eliminate such inconsistency.

Whenever requested by the EPA Regional Administrator(s) of the U.S. Environmental Protection Agency, the Insurer agrees to furnish to the EPA Regional Administrator(s) a duplicate original of the policy listed above, including all endorsements thereon.

I hereby certify that the wording of this certificate is identical to the wording specified in 40 CFR 144.70(e) as such regulations were constituted on the date shown immediately below.

[Authorized signature of Insurer]

[Name of person signing]

[Title of person signing]

[Signature of witness or notary:]

____

[Date]

(f) A letter from the chief financial officer, as specified in § 144.63(f) of this chapter, must be worded as follows, except that instructions in brackets are to be replaced with the relevant information and the brackets deleted:

LETTER FROM CHIEF FINANCIAL OFFICER

[Address to Regional Administrator of every Region in which injection wells for which financial responsibility is to be demonstrated through the financial test are located.]

I am the chief financial officer of [name and address of firm.] This letter is in support of this firm's use of the financial test to demonstrate financial assurance, as specified in Subpart F of 40 CFR Part 144.

[Fill out the following four paragraphs regarding injection wells and associated cost estimates. If your firm has no injection wells that belong in a particular paragraph, write "None" in the space indicated. For each injection well, include its EPA Identification Number, name, address, and current plugging and abandonment cost estimate.]

1. This firm is the owner or operator of the following injection wells for which financial assurance for plugging and abandonment is demonstrated through the financial test specified in Subpart F of 40 CFR Part 144. The current plugging and abandonment cost estimate covered by the test is shown for each injection well: ——.

2. This firm guarantees, through the corporate guarantee specified in Subpart F of 40 CFR Part 144, the plugging and abandonment of the following injection wells owned or operated by subsidaries of this firm. The current cost estimate for plugging and abandonment so guaranteed is shown for each injection well: ———.

3. In States where EPA is not administering the financial requirements of Subpart F of 40 CFR Part 144, this firm, as owner or

operator or guarantor, is demonstrating financial assurance for the plugging and abandoment of the following injection wells through the use of a test equivalent or substantially equivalent to the financial test specified in Subpart F of 40 CFR Part 144. The current plugging and abandonment cost estimate covered by such a test is shown for each injection well: ————.

4. This firm is the owner or operator of the following injection wells for which financial assurance for plugging and abandonment is not demonstrated either to EPA or a State through the financial test or any other financial assurance mechanism specified in Subpart F of 40 CFR Part 144 or equivalent or substantially equivalent State mechanisms. The current plugging and abandonment cost estimate not covered by such financial assurance is shown for each injection well: ————.

This firm [insert "is required" or "is not required"] to file a Form 10K with the Securities and Exchange Commission (SEC) for the latest fiscal year.

The fiscal year of this firm ends on [month, day]. The figures for the following items marked with an asterisk are derived from this firm's independently audited, year-end financial statements for the latest completed fiscal year, ended [date].

[Fill in Alternative I if the criteria of paragraph (f)(1)(i) of § 144.63 of this chapter are used. Fill in Alternative II if the criteria of paragraph (f)(1)(ii) of § 144.63 of this chapter are used.]

ALTERNATIVE I

1. (a) Current plugging and abandonment cost	$————
(b) Sum of the company's financial responsibilities under 40 CFR Parts 264 and 265, Subpart H, currently met using the financial test or corporate guarantee	
(c) Total of lines a and b	
*2. Total liabilities [if any portion of the plugging and abandonment cost is included in total liabilities, you may deduct the amount of that portion from this line and add that amount to lines 3 and 4]	
*3. Tangible net worth	
*4. Net worth	
*5. Current assets	
*6. Current liabilities	
*7. Net working capital [line 5 minus line 6]	
*8. The sum of net income plus depreciation, depletion and amortization	
*9. Total assets in U.S. (required only if less than 90% of firm's assets are located in U.S.)	

	Yes	No
10. Is line 3 at least $10 million?		
11. Is line 3 at least 6 times line 1(c)?		
12. Is line 7 at least 6 times line 1(c)?		
*13. Are at least 90% of firm's assets located in the U.S.? If not, complete line 14.		
14. Is line 9 at least 6 times line 1(c)?		
15. Is line 2 divided by line 4 less than 2.0?		
16. Is line 8 divided by line 2 greater than 0.1?		
17. Is line 5 divided by line 6 greater than 1.5?		

ALTERNATIVE II

1. (a) Current plugging and abandonment cost	$—
(b) Sum of the company's financial responsibilities under 40 CFR Parts 264 and 265, Subpart H, currently met using the financial test or corporate guarantee	
(c) Total of lines a and b	
2. Current bond rating of most recent issuance of this firm and name of rating service	
3. Date of issuance of bond	
4. Date of maturity of bond	
*5. Tangible net worth [if any portion of the plugging and abandonment cost estimate is included in "total liabilities" on your firm's financial statements, you may add the amount of that portion to this line]	
*6. Total assets in U.S. (required only if less than 90% of firm's assets are located in U.S.)	

	Yes
7. Is line 5 at least $10 million?	
8. Is line 5 at least 6 times line 1(c)?	
*9. Are at least 90% of the firm's assets located in the U.S.? If not, complete line 10	
10. Is line 6 at least 6 times line 1(c)?	

I hereby certify that the wording of
letter is identical to the wording specifie
40 CFR 144.70(f) as such regulations
constituted on the date shown immedia
below.

[Signature]
[Name]
[Title]
[Date]

(g) A corporate guarantee as sp
fied in § 144.63(e) must be worded
follows except that instructions
brackets are to be replaced with
relevant information and the brack
ed material deleted:

GUARANTEE FOR PLUGGING AND ABANDONM

Guarantee made this ——day of ——
19 ——, by [name of guaranteeing entity
business corporation organized under
laws of the State of ————, herein
ferred to as guarantor, to the United St
Environmental Protection Agency (E

obligee, on behalf of our subsidiary [owner or operator] of [business address].

Recitals

1. Guarantor meets or exceeds the financial test criteria and agrees to comply with the reporting requirements for guarantors as specified in 40 CFR 144.63(e).

2. [Owner or operator] owns or operates the following Class I hazardous waste injection well covered by this guarantee: [List for each facility: EPA Identification Number, name, and address. Indicate for each whether guarantee is for closure, post-closure care, or both.]

3. "Plugging and abandonment plan" as used below refers to the plans maintained as required by 40 CFR Part 144 for the plugging and abandonment of injection wells as identified above.

4. For value received from [owner or operator], guarantor guarantees to EPA that in the event that [owner or operator] fails to perform ["plugging and abandonment"] of the above facility(ies) in accordance with the plugging and abandonment plan and other requirements when required to do so, the guarantor will do so or fund a trust fund as specified in 40 CFR 144.63 in the name of [owner or operator] in the amount of the adjusted plugging and abandonment cost estimates prepared as specified in 40 CFR 144.62.

5. Guarantor agrees that, if at the end of any fiscal year before termination of this guarantee, the guarantor fails to meet the financial test criteria, guarantor will send within 90 days, by certified mail, notice to the EPA Regional Administrator(s) for the Region(s) in which the facility(ies) is (are) located and to [owner or operator] that he intends to provide alternate financial assurance as specified in 40 CFR 144.63 in the name of [owner or operator]. Within 30 days after sending such notice, the guarantor will establish such financial assurance if [owner or operator] has not done so.

6. The guarantor agrees to notify the Regional Administrator, by certified mail, of a voluntary or involuntary case under Title 11, U.S. Code, naming guarantor as debtor, within 10 days after its commencement.

7. Guarantor agrees that within 30 days after being notified by an EPA Regional Administrator of a determination that guarantor no longer meets the financial test criteria or that he is disallowed from continuing as a guarantor of plugging and adandonment, he will establish alternate financial assurance, as specified in 40 CFR 144.63, in the name of [owner or operator] if [owner or operator] has not done so.

8. Guarantor agrees to remain bound under this guarantee notwithstanding any or all of the following: amendment or modification of the plugging and abandonment plan, the extension or reduction of the time of performance of plugging and abandonment or any other modification or alteration of an obligation of [owner or operator] pursuant to 40 CFR Part 144.

9. Guarantor agrees to remain bound under this guarantee for so long as [owner or operator] must comply with the applicable financial assurance requirements of 40 CFR Part 144 for the above-listed facilities, except that guarantor may cancel this guarantee by sending notice by certified mail, to the EPA Regional Administrator(s) for the Region(s) in which the facility(ies) is (are) located and to [owner or operator], such cancellation to become effective no earlier than 120 days after actual receipt of such notice by both EPA and [owner or operator] as evidenced by the return receipts.

10. Guarantor agrees that if [owner or operator] fails to provide alternate financial assurance and obtain written approval of such assurance from the EPA Regional Administrator(s) within 90 days after a notice of cancellation by the guarantor is received by both the EPA Regional Administrator(s) and [owner or operator], guarantor will provide alternate financial assurance as specified in 40 CFR 144.63 in the name of [owner or operator].

11. Guarantor expressly waives notice of acceptance of this guarantee by the EPA or by [owner or operator]. Guarantor also expressly waives notice of amendments or modifications of the plugging and abandonment plan.

I hereby certify that the wording of this guarantee is identical to the wording specified in 40 CFR 144.70(f).

Effective date: ———.

[Name of guarantor]

[Authorized signature for guarantor]

[Type name of person signing]

[Title of person signing]

Signature of witness or notary: ———

PART 145—STATE UIC PROGRAM REQUIREMENTS

Subpart A—General Program Requirements

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AUTHORITY: 42 U.S.C. 300f *et seq.*

SOURCE: 48 FR 14202, Apr. 1, 1983, unless otherwise noted.

Subpart A—General Program Requirements

§ 145.1 Purpose and scope.

(a) This part specifies the procedures EPA will follow in approving, revising, and withdrawing State programs under section 1422 (underground injection control—UIC) of SDWA, and includes the elements which must be part of submissions to EPA for program approval and the substantive provisions which must be present in State programs for them to be approved.

(b) State submissions for program approval must be made in accordance with the procedures set out in Subpart C. This includes developing and submitting to EPA a program description (§ 145.23), an Attorney General's Statement (§ 145.24), and a Memorandum of Agreement with the Regional Administrator (§ 145.25).

(c) The substantive provisions which must be included in State programs to obtain approval include requirements for permitting, compliance evaluation, enforcement, public participation, and sharing of information. The requirements are found in Subpart B. Many of the requirements for State programs are made applicable to States by cross-referencing other EPA regulations. In particular, many of the provisions of Parts 144 and 124 are made applicable to States by the references contained in § 145.11.

(d) Upon submission of a complete program, EPA will conduct a public hearing, if interest is shown, and determine whether to approve or disapprove the program taking into consideration the requirements of this part, the Safe Drinking Water Act and any comments received.

(e) Upon approval of a State program, the Administrator shall suspend the issuance of Federal permits for those activities subject to the approved State program.

(f) Any State program approved by the Administrator shall at all times be conducted in accordance with the requirements of this part.

(g) Nothing in this part precludes a State from:

(1) Adopting or enforcing requirements which are more stringent or more extensive than those required under this part;

(2) Operating a program with a greater scope of coverage than that required under this part. Where an approved State program has a greater scope of coverage than required by Federal law the additional coverage is not part of the federally approved program.

(h) Section 1451 of the SDWA authorizes the Administrator to delegate primary enforcement responsibility for the Underground Injection Control Program to Indian Tribes. An Indian Tribe must establish its eligibility to be treated as a State before it is eligible to apply for Underground Injection Control grants and primary enforcement responsibility. All requirements of Parts 124, 144, 145, and 146 that apply to States with UIC primary enforcement responsibility also apply to Indian Tribes except where specifically noted.

[48 FR 14202, Apr. 1, 1983, as amended at 53 FR 37412, Sept. 26, 1988]

§ 145.2 Definitions.

The definitions of Part 144 apply to all subparts of this part.

Subpart B—Requirements for State Programs

§ 145.11 Requirements for permitting.

(a) All State programs under this part must have legal authority to implement each of the following provisions and must be administered in conformance with each; except that States are not precluded from omitting or modifying any provisions to impose more stringent requirements.

(1) Section 144.5(b)—(Confidential information);

(2) Section 144.6—(Classification of injection wells);

(3) Section 144.7—(Identification of underground sources of drinking water and exempted aquifers);

(4) Section 144.8—(Noncompliance reporting);

(5) Section 144.11—(Prohibition of unauthorized injection);

(6) Section 144.12—(Prohibition of movement of fluids into underground sources of drinking water);

(7) Section 144.13—(Elimination of Class IV wells);

(8) Section 144.14—(Requirements for wells managing hazardous waste);

(9) Sections 144.21-144.26—(Authorization by rule);

(10) Section 144.31—(Application for a permit);

(11) Section 144.32—(Signatories);

(12) Section 144.33—(Area Permits);

(13) Section 144.34—(Emergency permits);

(14) Section 144.35—(Effect of permit);

(15) Section 144.36—(Duration);

(16) Section 144.38—(Permit transfer);

(17) Section 144.39—(Permit modification);

(18) Section 144.40—(Permit termination);

(19) Section 144.51—(Applicable permit conditions);

(20) Section 144.52—(Establishing permit conditions);

(21) Section 144.53(a)—(Schedule of compliance);

(22) Section 144.54—(Monitoring requirements);

(23) Section 144.55—(Corrective Action);

(24) Section 124.3(a)—(Application for a permit);

(25) Section 124.5 (a), (c), (d), and (f)—(Modification of permits);

(26) Section 124.6 (a), (c), (d), and (e)—(Draft Permit);

(27) Section 124.8—(Fact sheets);

(28) Section 124.10 (a)(1)(ii), (a)(1)(iii), (a)(1)(v), (b), (c), (d), and (e)—(Public notice);

(29) Section 124.11—(Public comments and requests for hearings);

(30) Section 124.12(a)—(Public hearings); and

(31) Section 124.17 (a) and (c)—(Response to comments).

(b)(1) States need not implement provisions identical to the provisions listed in paragraphs (a) (1) through (31) of this section. Implemented provisions must, however, establish requirements at least as stringent as the corresponding listed provisions. While States may impose more stringent requirements, they may not make one requirement more lenient as a tradeoff for making another requirement more stringent; for example, by requiring that public hearings be held prior to issuing any permit while reducing the amount of advance notice of such a hearing.

(2) State programs may, if they have adequate legal authority, implement any of the provisions of Parts 144 and 124. See, for example § 144.37(d) (continuation of permits) and § 124.4 (consolidation of permit processing).

§ 145.12 Requirements for compliance evaluation programs.

(a) State programs shall have procedures for receipt, evaluation, retention and investigation for possible enforcement of all notices and reports required of permittees and other regulated persons (and for investigation for possible enforcement of failure to submit these notices and reports).

(b) State programs shall have inspection and surveillance procedures to determine, independent of information supplied by regulated persons, compliance or noncompliance with applicable program requirements. The State shall maintain:

(1) A program which is capable of making comprehensive surveys of all facilities and activities subject to the State Director's authority to identify persons subject to regulation who have failed to comply with permit application or other program requirements. Any compilation, index, or inventory of such facilities and activities shall be made available to the Regional Administrator upon request;

(2) A program for periodic inspections of the facilities and activities subject to regulation. These inspections shall be conducted in a manner designed to:

(i) Determine compliance or noncompliance with issued permit conditions and other program requirements;

(ii) Verify the accuracy of information submitted by permittees and other regulated persons in reporting forms and other forms supplying monitoring data; and

(iii) Verify the adequacy of sampling, monitoring, and other methods used by permittees and other regulated persons to develop that information;

(3) A program for investigating information obtained regarding violations of applicable program and permit requirements; and

(4) Procedures for receiving and ensuring proper consideration of information submitted by the public about violations. Public effort in reporting violations shall be encouraged and the State Director shall make available information on reporting procedures.

(c) The State Director and State officers engaged in compliance evaluation shall have authority to enter any site or premises subject to regulation or in which records relevant to program operation are kept in order to copy any records, inspect, monitor or otherwise investigate compliance with permit conditions and other program requirements. States whose law requires a search warrant before entry conform with this requirement.

(d) Investigatory inspections shall be conducted, samples shall be taken and other information shall be gathered in a manner [e.g., using proper "chain of custody" procedures] that will produce evidence admissible in an enforcement proceeding or in court.

§ 145.13 Requirements for enforcement authority.

(a) Any State agency administering a program shall have available the following remedies for violations of State program requirements:

(1) To restrain immediately and effectively any person by order or by suit in State court from engaging in any unauthorized activity which is endangering or causing damage to public health or environment;

Note: This paragraph requires that States have a mechanism (e.g., an administrative cease and desist order or the ability to seek a temporary restraining order) to stop any unauthorized activity endangering public health or the environment.

(2) To sue in courts of competent jurisdiction to enjoin any threatened or continuing violation of any program requirement, including permit conditions, without the necessity of a prior revocation of the permit;

(3) To assess or sue to recover in court civil penalties and to seek criminal remedies, including fines, as follows:

(i) For all wells except Class II wells, civil penalties shall be recoverable for any program violation in at least the amount of $2,500 per day. For Class II wells, civil penalties shall be recoverable for any program violation in at least the amount of $1,000 per day.

(ii) Criminal fines shall be recoverable in at least the amount of $5,000 per day against any person who willfully violates any program requirement, or for Class II wells, pipeline (production) severance shall be imposable against any person who willfully violates any program requirement.

Note: In many States the State Director will be represented in State courts by the State Attorney General or other appropriate legal officer. Although the State Director need not appear in court actions he or she should have power to request that any of the above actions be brought.

(b)(1) The maximum civil penalty or criminal fine (as provided in paragraph (a)(3) of this section) shall be assessable for each instance of violation and, if the violation is continuous, hall be assessable up to the maximum amount for each day of violation.

(2) The burden of proof and degree of knowledge or intent required under State law for establishing violations under paragraph (a)(3) of this section, shall be no greater than the burden of proof or degree of knowledge or intent EPA must provide when it brings an action under the Safe Drinking Water Act.

NOTE: For example, this requirement is not met if State law includes mental state as an element of proof for civil violations.

(c) A civil penalty assessed, sought, or agreed upon by the State Director under paragraph (a)(3) of this section shall be appropriate to the violation.

NOTE: To the extent that State judgments or settlements provide penalties in amounts which EPA believes to be substantially inadequate in comparison to the amounts which EPA would require under similar facts, EPA, when authorized by the applicable statute, may commence separate actions for penalties.

In addition to the requirements of this paragraph, the State may have other enforcement remedies. The following enforcement options, while not mandatory, are highly recommended:

Procedures for assessment by the State of the costs of investigations, inspections, or monitoring surveys which lead to the establishment of violations;

Procedures which enable the State to assess or to sue any persons responsible for unauthorized activities for any expenses incurred by the State in removing, correcting, or terminating any adverse effects upon human health and the environment resulting from the unauthorized activity, or both; and

Procedures for the administrative assessment of penalties by the Director.

(d) Any State administering a program shall provide for public participation in the State enforcement process by providing either:

(1) Authority which allows intervention as of right in any civil or administrative action to obtain remedies specified in paragraph (a) (1), (2) or (3) of this section by any citizen having an interest which is or may be adversely affected; or

(2) Assurance that the State agency or enforcement authority will:

(i) Investigate and provide written responses to all citizen complaints submitted pursuant to the procedures specified in § 145.12(b)(4);

(ii) Not oppose intervention by any citizen when permissive intervention may be authorized by statute, rule, or regulation; and

(iii) Publish notice of and provide at least 30 days for public comment on any proposed settlement of a State enforcement action.

(e) To the extent that an Indian Tribe does not assert or is precluded from asserting criminal enforcement authority the Administrator will assume primary enforcement responsibility for criminal violations. The Memorandum of Agreement in § 145.25 shall reflect a system where the Tribal agency will refer such violations to the Administrator in an appropriate and timely manner.

(Clean Water Act (33 U.S.C. 1251 *et seq.*), Safe Drinking Water Act (42 U.S.C. 300f *et seq.*), Clean Air Act (42 U.S.C. 7401 *et seq.*), Resource Conservation and Recovery Act (42 U.S.C. 6901 *et seq.*))

[48 FR 14202, Apr. 1, 1983, as amended at 48 FR 39621, Sept. 1, 1983; 53 FR 37412, Sept. 26, 1988]

§ 145.14 Sharing of information.

(a) Any information obtained or used in the administration of a State program shall be available to EPA upon request without restriction. If the information has been submitted to the State under a claim of confidentiality, the State must submit that claim to EPA when providing information under this section. Any information obtained from a State and subject to a claim of confidentiality will be treated in accordance with the regulations in 40 CFR Part 2. If EPA obtains from a State information that is not claimed to be confidential, EPA may make that information available to the public without further notice.

(b) EPA shall furnish to States with approved programs the information in its files not submitted under a claim of confidentiality which the State needs to implement its approved program. EPA shall furnish to States with approved programs information submitted to EPA under a claim of confidentiality, which the State needs to implement its approved program, subject to the conditions in 40 CFR Part 2.

Subpart C—State Program Submissions

§ 145.21 General requirements for program approvals.

(a) States shall submit to the Administrator a proposed State UIC program complying with § 145.22 of this part within 270 days of the date of promulgation of the UIC regulations on June 24, 1980. The administrator may, for good cause, extend the date for submission of a proposed State UIC program for up to an additional 270 days.

(b) States shall submit to the Administrator 6 months after the date of promulgation of the UIC regulations a report describing the State's progress in developing a UIC program. If the Administrator extends the time for submission of a UIC program an additional 270 days, pursuant to § 145.21(a), the State shall submit a second report six months after the first report is due. The Administrator may prescribe the manner and form of the report.

(c) The requirements of § 145.21 (a) and (b) shall not apply to Indian Tribes.

(d) EPA will establish a UIC program in any State which does not comply with paragraph (a) of this section. EPA will continue to operate a UIC program in such a State until the State receives approval of a UIC program in accordance with the the requirements of this part.

NOTE: States which are authorized to administer the NPDES permit program under section 402 of CWA are encouraged to rely on existing statutory authority, to the extent possible, in developing a State UIC program. Section 402(b)(1)(D) of CWA requires that NPDES States have the authority "to issue permits which control the disposal of pollutants into wells." In many instances, therefore, NPDES States will have existing statutory authority to regulate well disposal which satisfies the requirements of the UIC program. Note, however, that CWA excludes certain types of well injections from the definition of "pollutant." If the State's statutory authority contains a similar exclusion it may need to be modified to qualify for UIC program approval.

(e) If a State can demonstrate
EPA's satisfaction that there are
underground injections within
State for one or more classes of inje
tion wells (other than Class IV well
subject to SDWA and that such inje
tions cannot legally occur in the Sta
until the State has developed an a
proved program for those classes of i
jections, the State need not submit
program to regulate those injectio
and a partial program may be a
proved. The demonstration of leg
prohibition shall be made by either e
plicitly banning new injections of t
class not covered by the State progra
or providing a certification from t
State Attorney General that such n
injections cannot legally occur un
the State has developed an approv
program for that class. The State sh
submit a program to regulate bo
those classes of injections for which
demonstration is not made and cla
IV wells.

(f) When a State UIC program
fully approved by EPA to regulate
classes of injections, the State assum
primary enforcement authority und
section 1422(b)(3) of SDWA. EPA
tains primary enforcement responsib
ity whenever the State program is d
approved in whole or in part. Stat
which have partially approved p
grams have authority to enforce a
violation of the approved portion
their program. EPA retains author
to enforce violations of State und
ground injection control program
except that, when a State has a fu
approved program, EPA will not ta
enforcement actions without providi
prior notice to the State and otherw
complying with section 1423 of SDW

(g) A State can assume primary
forcement responsibility for the U
program, notwithstanding § 145.21(
when the State program is unable
regulate activities on Indian lan
within the State. EPA will adminis
the program on Indian lands if
State does not seek this authority.

[48 FR 14202, Apr. 1, 1983, as amended at
FR 37412, Sept. 26, 1988]

§ 145.22 Elements of a program submission.

(a) Any State that seeks to administer a program under this part shall submit to the Administrator at least three copies of a program submission. The submission shall contain the following:

(1) A letter from the Governor of the State requesting program approval;

(2) A complete program description, as required by § 145.23, describing how the State intends to carry out its responsibilities under this part;

(3) An Attorney General's statement as required by § 145.24;

(4) A Memorandum of Agreement with the Regional Administrator as required by § 145.25;

(5) Copies of all applicable State statutes and regulations, including those governing State administrative procedures;

(6) The showing required by § 145.31(b) of the State's public participation activities prior to program submission.

(b) Within 30 days of receipt by EPA of a State program submission, EPA will notify the State whether its submission is complete. If EPA finds that a State's submission is complete, the statutory review period (i.e., the period of time allotted for formal EPA review of a proposed State program under the Safe Drinking Water Act) shall be deemed to have begun on the date of receipt of the State's submission. If EPA finds that a State's submission is incomplete, the statutory review period shall not begin until all the necessary information is received by EPA.

(c) If the State's submission is materially changed during the statutory review period, the statutory review period shall begin again upon receipt of the revised submission.

(d) The State and EPA may extend the statutory review period by agreement.

§ 145.23 Program description.

Any State that seeks to administer a program under this part shall submit a description of the program it proposes to administer in lieu of the Federal program under State law or under an interstate compact. The program description shall include:

(a) A description in narrative form of the scope, structure, coverage and processes of the State program.

(b) A description (including organization charts) of the organization and structure of the State agency or agencies which will have responsibility for administering the program, including the information listed below. If more than one agency is responsible for administration of a program, each agency must have statewide jurisdiction over a class of activities. The responsibilities of each agency must be delineated, their procedures for coordination set forth, and an agency may be designated as a "lead agency" to facilitate communications between EPA and the State agencies having program responsibility. When the State proposes to administer a program of greater scope of coverage than is required by Federal law, the information provided under this paragraph shall indicate the resources dedicated to administering the Federally required portion of the program.

(1) A description of the State agency staff who will carry out the State program, including the number, occupations, and general duties of the employees. The State need not submit complete job descriptions for every employee carrying out the State program.

(2) An itemization of the estimated costs of establishing and administering the program for the first two years after approval, including cost of the personnel listed in paragraph (b)(1) of this section, cost of administrative support, and cost of technical support.

(3) An itemization of the sources and amounts of funding, including an estimate of Federal grant money, available to the State Director for the first two years after approval to meet the costs listed in paragraph (b)(2) of this section, identifying any restrictions or limitations upon this funding.

(c) A description of applicable State procedures, including permitting procedures and any State administrative or judicial review procedures.

(d) Copies of the permit form(s), application form(s), reporting form(s), and manifest format the State intends to employ in its program. Forms used by States need not be identical to the forms used by EPA but should require the same basic information. The State need not provide copies of uniform national forms it intends to use but should note its intention to use such forms.

NOTE: States are encouraged to use uniform national forms established by the Administrator. If uniform national forms are used, they may be modified to include the State Agency's name, address, logo, and other similar information, as appropriate, in place of EPA's.

(e) A complete description of the State's compliance tracking and enforcement program.

(f) A State UIC program description shall also include:

(1) A schedule for issuing permits within five years after program approval to all injection wells within the State which are required to have permits under this part and Part 144;

(2) The priorities (according to criteria set forth in 40 CFR 146.09) for issuing permits, including the number of permits in each class of injection well which will be issued each year during the first five years of program operation;

(3) A description of how the Director will implement the mechanical integrity testing requirements of 40 CFR 146.08, including the frequency of testing that will be required and the number of tests that will be reviewed by the Director each year;

(4) A description of the procedure whereby the Director will notify owners and operators of injection wells of the requirement that they apply for and obtain a permit. The notification required by this paragraph shall require applications to be filed as soon as possible, but not later than four years after program approval for all injection wells requiring a permit;

(5) A description of any rule under which the Director proposes to authorize injections, including the text of the rule;

(6) For any existing enhanced recovery and hydrocarbon storage wells which the Director proposes to authorize by rule, a description of the procedure for reviewing the wells for compliance with applicable monitoring, reporting, construction, and financial responsibility requirements of §§ 144.51 and 144.52, and 40 CFR Part 146;

(7) A description of and schedule for the State's program to establish and maintain a current inventory of injection wells which must be permitted under State law;

(8) Where the Director had designated underground sources of drinking water in accordance with § 144.7(a), a description and identification of all such designated sources in the State;

(9) A description of aquifers, or parts thereof, which the Director has identified under § 144.7(b) as exempted aquifers, and a summary of supporting data;

(10) A description of and schedule for the State's program to ban Class IV wells prohibited under § 144.13; and

(11) A description of and schedule for the State's program to establish an inventory of Class V wells and to assess the need for a program to regulate Class V wells.

§ 145.24 Attorney General's statement.

(a) Any State that seeks to administer a program under this part shall submit a statement from the State Attorney General (or the attorney for those State or interstate agencies which have independent legal counsel) that the laws of the State, or an interstate compact, provide adequate authority to carry out the program described under § 145.23 and to meet the requirements of this part. This statement shall include citations to the specific statutes, administrative regulations, and, where appropriate, judicial decisions which demonstrate adequate authority. State statutes and regulations cited by the State Attorney General or independent legal counsel shall be in the form of lawfully adopted State statutes and regulations at the time the statement is signed and shall be fully effective by the time the program is approved. To qualify as "independent legal counsel" the attorney signing the statement required by this section must have full authority to independently represent the State agency in court on all matters pertaining to the State program.

NOTE: EPA will supply States with an Attorney General's statement format on request.

(b) When a State seeks authority over activities on Indian lands, the statement shall contain an appropriate analysis of the State's authority.

§ 145.25 Memorandum of Agreement with the Regional Administrator.

(a) Any State that seeks to administer a program under this part shall submit a Memorandum of Agreement. The Memorandum of Agreement shall be executed by the State Director and the Regional Administrator and shall become effective when approved by the Administrator. In addition to meeting the requirements of paragraph (b) of this section, the Memorandum of Agreement may include other terms, conditions, or agreements consistent with this Part and relevant to the administration and enforcement of the State's regulatory program. The Administrator shall not approve any Memorandum of Agreement which contains provisions which restrict EPA's statutory oversight responsibility.

(b) The Memorandum of Agreement shall include the following:

(1) Provisions for the prompt transfer from EPA to the State of pending permit applications and any other information relevant to program operation not already in the possession of the State Director (e.g., support files for permit issuance, compliance reports, etc.). When existing permits are transferred from EPA to State for administration, the Memorandum of Agreement shall contain provisions specifying a procedure for transferring the administration of these permits. If a State lacks the authority to directly administer permits issued by the Federal government, a procedure may be established to transfer responsibility for these permits.

NOTE: For example, EPA and the State and the permittee could agree that the State would issue a permit(s) identical to the outstanding Federal permit which would simultaneously be terminated.

(2) Provisions specifying classes and categories of permit applications, draft permits, and proposed permits that the State will send to the Regional Administrator for review, comment and, where applicable, objection.

(3) Provisions specifying the frequency and content of reports, documents and other information which the State is required to submit to EPA. The State shall allow EPA to routinely review State records, reports, and files relevant to the administration and enforcement of the approved program. State reports may be combined with grant reports where appropriate.

(4) Provisions on the State's compliance monitoring and enforcement program, including:

(i) Provisions for coordination of compliance monitoring activities by the State and by EPA. These may specify the basis on which the Regional Administrator will select facilities or activities within the State for EPA inspection. The Regional Administrator will normally notify the State at least 7 days before any such inspection; an

(ii) Procedures to assure coordination of enforcement activities.

(5) When appropriate, provisions for joint processing of permits by the State and EPA, for facilities or activities which require permits from both EPA and the State under different programs. See § 124.4.

(6) Provisions for modification of the Memorandum of Agreement in accordance with this part.

(c) The Memorandum of Agreement, the annual program and grant and the State/EPA Agreement should be consistent. If the State/EPA Agreement indicates that a change is needed in the Memorandum of Agreement, the Memorandum of Agreement may be amended through the procedures set forth in this part. The State/EPA Agreement may not override the Memorandum of Agreement.

NOTE: Detailed program priorities and specific arrangements for EPA support of the State program will change and are therefore more appropriately negotiated in the context of annual agreements rather than in the MOA. However, it may still be appropriate to specify in the MOA the basis for such detailed agreements, e.g., a provision in the MOA specifying that EPA will select facilities in the State for inspection annually as part of the State/EPA agreement.

Subpart D—Program Approval, Revision and Withdrawal

§ 145.31 Approval process.

(a) Prior to submitting an application to the Administrator for approval of a State UIC program, the State shall issue public notice of its intent to adopt a UIC program and to seek program approval from EPA. This public notice shall:

(1) Be circulated in a manner calculated to attract the attention of interested persons. Circulation of the public notice shall include publication in enough of the largest newspapers in the State to attract Statewide attention and mailing to persons on appropriate State mailing lists and to any other persons whom the agency has reason to believe are interested;

(2) Indicate when and where the State's proposed program submission may be reviewed by the public;

(3) Indicate the cost of obtaining a copy of the submission;

(4) Provide for a comment period of not less than 30 days during which interested persons may comment on the proposed UIC program;

(5) Schedule a public hearing on the State program for no less than 30 days after notice of the hearing is published;

(6) Briefly outline the fundamental aspects of the State UIC program; and

(7) Identify a person that an interested member of the public may contact for further information.

(b) After complying with the requirements of paragraph (a) of this section any State may submit a proposed UIC program under section 1422 of SDWA and § 145.22 of this part to EPA for approval. Such a submission shall include a showing of compliance with paragraph (a) of this section; copies of all written comments received by the State; a transcript, recording or summary of any public hearing which was held by the State; and a responsiveness summary which identifies the public participation activities conducted, describes the matters presented to the public, summarizes significant comments received, and responds to these comments. A copy of the responsiveness summary shall be sent to those who testified at the hearing, and others upon request.

(c) After determining that a State's submission for UIC program approval is complete the Administrator shall issue public notice of the submission in the FEDERAL REGISTER and in accordance with paragraph (a)(1) of this section. Such notice shall:

(1) Indicate that a public hearing will be held by EPA no earlier than 30 days after notice of the hearing. The notice may require persons wishing to present testimony to file a request with the Regional Administrator, who may cancel the public hearing if sufficient public interest in a hearing is not expressed;

(2) Afford the public 30 days after the notice to comment on the State's submission; and

(3) Note the availability of the State submission for inspection and copying by the public.

(d) The Administrator shall approve State programs which conform to the applicable requirements of this part.

(e) Within 90 days of the receipt of a complete submission (as provided in § 145.22) or material amendment thereto, the Administrator shall by rule either fully approve, disapprove, or approve in part the State's UIC program taking into account any comments submitted. The Administrator shall give notice of this rule in the FEDERAL REGISTER and in accordance with paragraph (a)(1) of this section. If the Administrator determines not to approve the State program or to approve it only in part, the notice shall include a concise statement of the reasons for this determination. A responsiveness summary shall be prepared by the Regional Office which identifies the public participation activities conducted, describes the matters presented to the public, summarizes significant comments received, and explains the Agency's response to these comments. The responsiveness summary shall be sent to those who testified at the public hearing, and to others upon request.

§ 145.32 Procedures for revision of State programs.

(a) Either EPA or the approved State may initiate program revision. Program revision may be necessary when the controlling Federal or State statutory or regulatory authority is modified or supplemented. The state shall keep EPA fully informed of any proposed modifications to its basic statutory or regulatory authority, its forms, procedures, or priorities.

(b) Revision of a State program shall be accomplished as follows:

(1) The State shall submit a modified program description, Attorney General's statement, Memorandum of Agreement, or such other documents as EPA determines to be necessary under the circumstances.

(2) Whenever EPA determines that the proposed program revision is substantial, EPA shall issue public notice and provide an opportunity to comment for a period of at least 30 days. The public notice shall be mailed to interested persons and shall be published in the Federal Register and in enough of the largest newspapers in the State to provide Statewide coverage. The public notice shall summarize the proposed revisions and provide for the opportunity to request a public hearing. Such a hearing will be held is there if significant public interest based on requests received.

(3) The Administrator shall approve or disapprove program revisions based on the requirements of this part and of the Safe Drinking Water Act.

(4) A program revision shall become effective upon the approval of the Administrator. Notice of approval of any substantial revision shall be published in the Federal Register. Notice of approval of non-substantial program revisions may be given by a letter from the Administrator to the State Governor or his designee.

(c) States with approved programs shall notify EPA whenever they propose to transfer all or part of any program from the approved State agency to any other State agency, and shall identify any new division of responsibilities among the agencies involved. The new agency is not authorized to administer the program until approval by the Administrator under paragraph (b) of this section. Organizational charts required under § 145.23(b) shall be revised and resubmitted.

(d) Whenever the Administrator has reason to believe that circumstances have changed with respect to a State program, he may request, and the State shall provide, a supplemental Attorney General's statement, program description, or such other documents or information as are necessary.

(e) The State shall submit the information required under paragraph (b)(1) of this section within 270 days of any amendment to this part or 40 CFR Part 144, 146, or 124 which revises or adds any requirement respecting an approved UIC program.

§ 145.33 Criteria for withdrawal of State programs.

(a) The Administrator may withdraw program approval when a State program no longer complies with the requirements of this part, and the State fails to take corrective action. Such circumstances include the following:

(1) When the State's legal authority no longer meets their requirements of this part, including:

(i) Failure of the State to promulgate or enact new authorities when necessary; or

(ii) Action by a State legislature or court striking down or limiting State authorities.

(2) When the operation of the State program fails to comply with the requirements of this part, including:

(i) Failure to exercise control over activities required to be regulated under this part, including failure to issue permits;

(ii) Repeated issuance of permits which do not conform to the requirements of this part; or

(iii) Failure to comply with the public participation requirements of this part.

(3) When the State's enforcement program fails to comply with the requirements of this part, including:

(i) Failure to act on violations of permits or other program requirements;

(ii) Failure to seek adequate enforcement penalties or to collect administrative fines when imposed; or

(iii) Failure to inspect and monitor activities subject to regulation.

(4) When the State program fails to comply with the terms of the Memorandum of Agreement required under § 145.24.

§ 145.34 Procedures for withdrawal of State programs.

(a) A State with a program approved under this part may voluntarily transfer program responsibilities required by Federal law to EPA by taking the following actions, or in such other manner as may be agreed upon with the Administrator.

(1) The State shall give the Administrator 180 days notice of the proposed transfer and shall submit a plan for the orderly transfer of all relevant program information not in the possession of EPA (such as permits, permit files, compliance files, reports, permit applications) which are necessary for EPA to administer the program.

(2) Within 60 days of receiving the notice and transfer plan, the Administrator shall evaluate the State's transfer plan and shall identify any additional information needed by the Federal government for program administration and/or identify any other deficiencies in the plan.

(3) At least 30 days before the transfer is to occur the Administrator shall publish notice of the transfer in the FEDERAL REGISTER and in enough of the largest newspapers in the State to provide Statewide coverage, and shall mail notice to all permit holders, permit applicants, other regulated persons and other interested persons on appropriate EPA and State mailing lists.

(b) Approval of a State UIC program may be withdrawn and a Federal program established in its place when the Administrator determines, after holding a public hearing, that the State program is not in compliance with the requirements of SDWA and this part.

(1) *Notice to State of public hearing.* If the Administrator has cause to believe that a State is not administering or enforcing its authorized program in compliance with the requirements of SDWA and this part, he or she shall inform the State by registered mail of the specific areas of alleged noncompliance. If the State demonstrates to the Administrator within 30 days of such notification that the State program is in compliance, the Administrator shall take no further action toward withdrawal and shall so notify the State by registered mail.

(2) *Public hearing.* If the State has not demonstrated its compliance to the satisfaction of the Administrator within 30 days after notification, the Administrator shall inform the State Director and schedule a public hearing to discuss withdrawal of the State program. Notice of such public hearing shall be published in the FEDERAL REGISTER and in enough of the largest newspapers in the State to attract statewide attention, and mailed to persons on appropriate State and EPA mailing lists. This hearing shall be convened not less than 60 days nor more than 75 days following the publication of the notice of the hearing. Notice of the hearing shall identify the Administrator's concerns. All interested persons shall be given opportunity to make written or oral presentation on the State's program at the public hearing.

(3) *Notice to State of findings.* When the Administrator finds after the public hearing that the State is not in compliance, he or she shall notify the State by registered mail of the specific deficiencies in the State program and of necessary remedial actions. Within 90 days of receipt of the above letter, the State shall either carry out the required remedial action or the Administrator shall withdraw program approval. If the State carries out the remedial action or, as a result of the hearing is found to be in compliance, the Administrator shall so notify the State by registered mail and conclude the withdrawal proceedings.

Subpart E—Treatment of Indian Tribes as States

SOURCE: 53 FR 37412, Sept. 26, 1988, unless otherwise noted.

45.52 Requirements for treatment as a State.

The Administrator is authorized to eat an Indian Tribe as a State (for irposes of making the Tribe eligible apply for an Underground Injection ontrol Program) if it meets the fol- wing criteria:

(a) The Indian Tribe is recognized y the Secretary of the Interior.

(b) The Indian Tribe has a Tribal overning body which is currently carrying out substantial governmen- l duties and powers" over a defined rea, (*i.e.*, is currently performing gov- rnmental functions to promote the ealth, safety, and welfare of the af- ected population within a defined ge- graphic area).

(c) The Indian Tribe demonstrates hat the functions to be performed in egulating the underground injection vells that the applicant intends to regulate are within the area of the Indian Tribal government's jurisdiction.

(d) The Indian Tribe is reasonably expected to be capable, in the Administrator's judgment of administering (in a manner consistent with the terms and purposes of the Act and all applicable regulations) an effective Underground Injection Control Program by the existence of management and technical skills necessary to administer an effective Underground Injection Control Program or a plan to acquire the additional management and/or technical skills to administer an effective Underground Injection Control Program; by the existence of institutions to exercise executive, legislative, and judicial functions; by a history of successful managerial performance of public health or environmental programs; and by acceptable accounting and procurement procedures.

§ 145.56 Request by an Indian Tribe for a determination of treatment as a State.

An Indian Tribe may apply to the Administrator for a determination that it qualifies for treatment as a State pursuant to section 1451 of the Act. The application shall be concise and describe how the Indian Tribe will meet each of the requirements of § 145.52. The application shall consist of the following:

(a) A statement that the Tribe is recognized by the Secretary of the Interior.

(b) A descriptive statement demonstrating that the Tribal governing body is currently carrying out substantial governmental duties and powers over a defined area. The statement shall:

(1) Describe the form of the Tribal government;

(2) Describe the types of governmental functions currently performed by the Tribal governing body such as, but not limited to, the exercise of police powers affecting (or relating to) the health, safety, and welfare of the affected population; taxation; and the exercise of the power of eminent domain; and

(3) Identify the sources of the Tribal government's authority to carry out the governmental functions currently being performed.

(c) A map or legal description of the area over which the Indian Tribe asserts jurisdiction; a statement by the Tribal Attorney General (or equivalent official) which describes the basis for the Tribe's jurisdictional assertion (including the nature or subject matter of the asserted jurisdiction); a copy of all documents such as Tribal constitutions, by-laws, charters, executive orders, codes, ordinances, and/or resolutions which support the Tribe's asserted jurisdiction; and a description of the locations of the underground injection wells the Tribe proposes to regulate.

(d) A narrative statement describing the capability of the Indian Tribe to administer an effective Underground Injection Control program which shall include:

(1) A description of the Indian Tribe's previous management experience including, but not limited to, the administration of programs and services authorized under the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450 *et seq.*), the Indian Mineral Development Act (25 U.S.C. 2101 *et seq.*), or the Indian Sanitation Facilities Construction Activity Act (42 U.S.C. 2004a).

(2) A list of existing environmental or public health programs administered by the Tribal governing body

and a copy of related Tribal laws, regulations and policies.

(3) A description of the Indian Tribe's accounting and procurement systems.

(4) A description of the entity (or entities) which exercise the executive, legislative, and judicial functions of the Tribal government.

(5) A description of the existing, or proposed, agency of the Indian Tribe which will assume primary enforcement responsibility, including a description of the relationship between owners/operators of the underground injection wells and the agency.

(6) A description of the technical and administrative capabilities of the staff to administer and manage an effective Underground Injection Control Program or a plan which proposes how the Tribe will acquire additional administrative and/or technical expertise. The plan must address how the Tribe will obtain the funds to acquire the additional administrative and technical expertise.

(e) The Adminstrator may, in his discretion, request further documentation necessary to support a Tribal request for treatment as a State.

(f) If the Administrator has previously determined that a Tribe has met the requirement for "treatment as a State" for programs authorized under the Safe Drinking Water or the Clean Water Acts, then that Tribe may provide only that information unique to the Underground Injection Control program (*i.e.*, §§ 145.76(c) and 145.76(d)(6)).

§ 145.58 Procedure for processing an Indian Tribe's application for treatment as a State.

(a) The Administrator shall process a completed application of an Indian Tribe for treatment as a State submitted pursuant to § 145.56 in a timely manner. He shall promptly notify the Indian Tribe of receipt of the application.

(b) Within 30 days after receipt of the Indian Tribe's completed application for treatment as a State, the Administrator shall notify the appropriate governmental entities. Notice shall include information on the substance and base for the Tribe's jurisdictional assertions.

(c) Each governmental entity so notified by the Administrator shall have 30 days to comment upon the Tribe's assertion of jurisdiction. Comments by governmental entities shall be limited to the Tribe's assertion of jurisdiction.

(d) If a Tribe's asserted jurisdiction is subject to a competing or conflicting claim, the Administrator, after consultation with the Secretary of the Department of the Interior, or his designee, and in consideration of other comments received, shall determine whether the Tribe has adequately demonstrated the requisite jurisdiction for primacy for the Underground Injection Control Program.

(e) If the Administrator determines that a Tribe meets the requirements of § 145.52, the Indian Tribe is then eligible to apply for development grants and primary enforcement responsibility for an Underground Injection Control program and the associated funding under section 1443(b) of the Act and primary enforcement responsibility for the Underground Injection Control Program under sections 1422 and/or 1425 of the Act.

PART 146—UNDERGROUND INJECTION CONTROL PROGRAM: CRITERIA AND STANDARDS

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AUTHORITY: Safe Drinking Water Act, 42 .S.C. 300f *et seq.*; Resource Conservation nd Recovery Act, 42 U.S.C. 6901 *et seq.*

SOURCE: 45 FR 42500, June 24, 1980, unless therwise noted.

EDITORIAL NOTE: For a rule-related notice ffecting Part 146, see 52 FR 26342, July 14, 987.

Subpart A—General Provisions

§ 146.1 Applicability and scope.

(a) This part sets forth technical criteria and standards for the Underground Injection Control Program. This part should be read in conjunction with 40 CFR Parts 124, 144, and 145, which also apply to UIC programs. 40 CFR Part 144 defines the regulatory framework of EPA administered permit programs. 40 CFR Part 145 describes the elements of an approvable State program and procedures for EPA approval of State participation in the permit programs. 40 CFR Part 124 describes the procedures the Agency will use for issuing permits under the covered programs. Certain of these procedures will also apply to State-administered programs as specified in 40 CFR Part 145.

(b) Upon the approval, partial approval or promulgation of a State UIC program by the Administrator, any underground injection which is not authorized by the Director by rule or by permit is unlawful.

(Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act: 42 U.S.C. 6905, 6912, 6925, 6927, 6974)

[45 FR 42500, June 24, 1980, as amended at 48 FR 14293, Apr. 1, 1983]

§ 146.2 Law authorizing these regulations.

The laws authorizing these regulations and all other UIC program regulations are referenced in 40 CFR Part 144. They include sections 1421, 1422, 1423, 1431, 1445, 1447 and 1450 of the Public Health Service Act as amended by the Safe Drinking Water Act ("SDWA") (Pub. L. 93-523) and by the SDWA Amendments of 1977 (Pub. L. 95-190).

(Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act: 42 U.S.C. 6905, 6912, 6925, 6927, 6974)

[45 FR 42500, June 24, 1980, as amended at 48 FR 14293, Apr. 1, 1983]

§ 146.3 Definitions.

The following definitions apply to the underground injection control program.

Abandoned well means a well whose use has been permanently discontinued or which is in a state of disrepair such that it cannot be used for its intended purpose or for observation purposes.

Administrator means the Administrator of the United States Environmental Protection Agency, or an authorized representative.

Application means the EPA standard national forms for applying for a permit, including any additions, revisions or modifications to the forms; or forms approved by EPA for use in approved States, including any approved modifications or revisions. For RCRA, application also includes the information required by the Director under § 122.25 (contents of Part B of the RCRA application).

Aquifer means a geological formation, group of formations, or part of a formation that is capable of yielding a significant amount of water to a well or spring.

Area of review means the area surrounding an injection well described according to the criteria set forth in § 146.06 or in the case of an area permit, the project area plus a circumscribing area the width of which is either ¼ of a mile or a number calculated according to the criteria set forth in § 146.06.

Casing means a pipe or tubing of appropriate material, of varying diameter and weight, lowered into a borehole during or after drilling in order to support the sides of the hole and thus prevent the walls from caving, to prevent loss of drilling mud into porous ground, or to prevent water, gas, or other fluid from entering or leaving the hole.

Catastrophic collapse means the sudden and utter failure of overlying "strata" caused by removal of underlying materials.

Cementing means the operation whereby a cement slurry is pumped into a drilled hole and/or forced behind the casing.

Confining bed means a body of impermeable or distinctly less permeable material stratigraphically adjacent to one or more aquifers.

Confining zone means a geological formation, group of formations, or part of a formation that is capable of limiting fluid movement above an injection zone.

Contaminant means any physical, chemical, biological, or radiological substance or matter in water.

Conventional mine means an open pit or underground excavation for the production of minerals.

Director means the Regional Administrator, the State director or the Tribal director as the context requires, or an authorized representative. When there is no approved State or Tribal program, and there is an EPA administered program, "Director" means the Regional Administrator. When there is an approved State or Tribal program, "Director" normally means the State or Tribal director. In some circumstances, however, EPA retains the authority to take certain actions even when there is an approved State or Tribal program. (For example, when EPA has issued an NPDES permit prior to the approval of a State program, EPA may retain jurisdiction over that permit after program approval; see § 123.69). In such cases, the term "Director" means the Regional Administrator and not the State or Tribal director.

Disposal well means a well used for the disposal of waste into a subsurface stratum.

Effective date of a UIC program means the date that a State UIC program is approved or established by the Administrator.

Environmental Protection Agency ("EPA") means the United States Environmental Protection Agency.

EPA means the United States "Environmental Protection Agency."

Exempted acquifer means an aquifer or its portion that meets the criteria in the definition of "underground sourc of drinking water" but which has bee exempted according to the procedure of § 144.8(b).

Existing injection well means an "injection well" other than a "new injection well."

Experimental technology means technology which has not been prove feasible under the conditions in whic it is being tested.

Facility or activity means an "HWM facility," UIC "injection well

NPDES "point source," or State 404 dredge and fill activity, or any other facility or activity (including land or appurtenances thereto) that is subject to regulation under the RCRA, UIC, NPDES, or 404 programs.

Fault means a surface or zone of rock fracture along which there has been displacement.

Flow rate means the volume per time unit given to the flow of gases or other fluid substance which emerges from an orifice, pump, turbine or passes along a conduit or channel.

Fluid means material or substance which flows or moves whether in a semisolid, liquid, sludge, gas, or any other form or state.

Formation means a body of rock characterized by a degree of lithologic homogeneity which is prevailingly, but not necessarily, tabular and is mappable on the earth's surface or traceable in the subsurface.

Formation fluid means "fluid" present in a "formation" under natural conditions as opposed to introduced fluids, such as drilling mud.

Generator means any person, by site location, whose act or process produces hazardous waste identified or listed in 40 CFR Part 261.

Ground water means water below the land surface in a zone of saturation.

Hazardous waste means a hazardous waste as defined in 40 CFR 261.3.

Hazardous Waste Management facility ("HWM facility") means all contiguous land, and structures, other appurtenances, and improvements on the land used for treating, storing, or disposing of hazardous waste. A facility may consist of several treatment, storage, or disposal operational units (for example, one or more landfills, surface impoundments, or combination of them).

HWM facility means "Hazardous Waste Management facility."

Indian Tribe means any Indian Tribe having a Federally recognized governing body carrying out substantial governmental duties and powers over a defined area.

Injection well means a "well" into which "fluids" are being injected.

Injection zone means a geological "formation", group of formations, or part of a formation receiving fluids through a well.

Lithology means the description of rocks on the basis of their physical and chemical characteristics.

Owner or operator means the owner or operator of any facility or activity subject to regulation under the RCRA, UIC, NPDES, or 404 programs.

Packer means a device lowered into a well to produce a fluid-tight seal.

Permit means an authorization, license, or equivalent control document issued by EPA or an "approved State" to implement the requirements of this part and Parts 124, 144, and 145. Permit does not include RCRA interim status (§ 122.23), UIC authorization by rule (§§ 144.21 to 144.26 and 144.15), or any permit which has not yet been the subject of final agency action, such as a "draft permit" or a "proposed permit."

Plugging means the act or process of stopping the flow of water, oil or gas into or out of a formation through a borehole or well penetrating that formation.

Plugging record means a systematic listing of permanent or temporary abandonment of water, oil, gas, test, exploration and waste injection wells, and may contain a well log, description of amounts and types of plugging material used, the method employed for plugging, a description of formations which are sealed and a graphic log of the well showing formation location, formation thickness, and location of plugging structures.

Pressure means the total load or force per unit area acting on a surface.

Project means a group of wells in a single operation.

Radioactive waste means any waste which contains radioactive material in concentrations which exceed those listed in 10 CFR Part 20, Appendix B, Table II column 2.

RCRA means the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976 (Pub. L. 94-580, as amended by Pub. L. 95-609, 42 U.S.C. 6901 *et seq.*).

SDWA means the Safe Drinking Water Act (Pub. L. 95-523, as amended by Pub. L. 95-190, 42 U.S.C. 300(f) *et seq.*).

Site means the land or water area where any facility or activity is physically located or conducted, including adjacent land used in connection with the facility or activity.

Sole or principal source aquifer means an aquifer which has been designated by the Administrator pursuant to section 1424 (a) or (e) of the SDWA.

State Director means the chief administrative officer of any State, interstate, or Tribal agency operating an "approved program," or the delegated representative of the State Director. If the responsibility is divided among two or more State, interstate, or Tribal agencies, "State Director" means the chief administrative officer of the State, interstate, or Tribal agency authorized to perform the particular procedure or function to which reference is made.

Stratum (plural *strata*) means a single sedimentary bed or layer, regardless of thickness, that consists of generally the same kind of rock material.

Subsidence means the lowering of the natural land surface in response to: Earth movements; lowering of fluid pressure; removal of underlying supporting material by mining or solution of solids, either artificially or from natural causes; compaction due to wetting (Hydrocompaction); oxidation of organic matter in soils; or added load on the land surface.

Surface casing means the first string of well casing to be installed in the well.

Total dissolved solids ("TDS") means the total dissolved (filterable) solids as determined by use of the method specified in 40 CFR Part 136.

UIC means the Underground Injection Control program under Part C of the Safe Drinking Water Act, including an "approved program."

Underground injection means a "well injection."

Underground source of drinking water (USDW) means an aquifer or its portion:

(1)(i) Which supplies any public water system; or

(ii) Which contains a sufficient quantity of ground water to supply a public water system; and

(A) Currently supplies drinking water for human consumption; or

(B) Contains fewer than 10,000 mg/l total dissolved solids; and

(2) Which is not an exempted aquifer.

USDW means "underground source of drinking water."

Well means a bored, drilled or driven shaft, or a dug hole, whose depth is greater than the largest surface dimension.

Well injection means the subsurface emplacement of fluids through a bored, drilled or driven well; or through a dug well, where the depth of the dug well is greater than the largest surface dimension.

Well plug means a watertight and gastight seal installed in a borehole or well to prevent movement of fluids.

Well stimulation means several processes used to clean the well bore, enlarge channels, and increase pore space in the interval to be injected thus making it possible for wastewater to move more readily into the formation, and includes (1) surging, (2) jetting, (3) blasting, (4) acidizing, (5) hydraulic fracturing.

Well monitoring means the measurement, by on-site instruments or laboratory methods, of the quality of water in a well.

(Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act: 42 U.S.C. 6905, 6912, 6925, 6927, 6974)

[45 FR 42500, June 24, 1980, as amended at 46 FR 43161, Aug. 27, 1981; 47 FR 4998, Feb. 3, 1982; 48 FR 14293, Apr. 1, 1983; 53 FR 37414, Sept. 26, 1988]

§ 146.4 Criteria for exempted aquifers.

An aquifer or a portion thereof which meets the criteria for an "underground source of drinking water" in § 146.3 may be determined under 40 CFR 144.8 to be an "exempted aquifer" if it meets the following criteria:

(a) It does not currently serve as a source of drinking water; and

(b) It cannot now and will not in the future serve as a source of drinking water because:

(1) It is mineral, hydrocarbon or geothermal energy producing, or can be demonstrated by a permit applicant as part of a permit application for a Class

II or III operation to contain minerals or hydrocarbons that considering their quantity and location are expected to be commercially producible.

(2) It is situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical;

(3) It is so contaminated that it would be economically ot technologically impractical to render that water fit for human consumption; or

(4) It is located over a Class III well mining area subject to subsidence or catastrophic collapse; or

(c) The total dissolved solids content of the ground water is more than 3,000 and less than 10,000 mg/l and it is not reasonably expected to supply a public water system.

(Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act: 42 U.S.C. 6905, 6912, 6925, 6927, 6974)

[45 FR 42500, June 24, 1980, as amended at 47 FR 4998, Feb. 3, 1982; 48 FR 14293, Apr. 1, 1983]

§ 146.5 Classification of injection wells.

Injection wells are classified as follows:

(a) *Class I.* (1) Wells used by generators of hazardous waste or owners or operators of hazardous waste management facilities to inject hazardous waste beneath the lowermost formation containing, within one quarter (¼) mile of the well bore, an underground source of drinking water.

(2) Other industrial and municipal disposal wells which inject fluids beneath the lowermost formation containing, within one quarter mile of the well bore, an underground source of drinking water.

(b) *Class II.* Wells which inject fluids:

(1) Which are brought to the surface in connection with conventional oil or natural gas production and may be commingled with waste waters from gas plants which are an integral part of production operations, unless those waters are classified as a hazardous waste at the time of injection.

(2) For enhanced recovery of oil or natural gas; and

(3) For storage of hydrocarbons which are liquid at standard temperature and pressure.

(c) *Class III.* Wells which inject for extraction of minerals including:

(1) Mining of sulfur by the Frasch process;

(2) In situ production of uranium or other metals. This category includes only in-situ production from ore bodies which have not been conventionally mined. Solution mining of conventional mines such as stopes leaching is included in Class V.

(3) Solution mining of salts or potash.

(d) *Class IV.* (1) Wells used by generators of hazardous waste or of radioactive waste, by owners or operators of hazardous waste management facilities, or by owners or operators of radioactive waste disposal sites to dispose of hazardous waste or radioactive waste into a formation which within one quarter (¼) mile of the well contains an underground source of drinking water.

(2) Wells used by generators of hazardous waste or of radioactive waste, by owners or operators of hazardous waste management facilities, or by owners or operators of radioactive waste disposal sites to dispose of hazardous waste or radioactive waste above a formation which within one quarter (¼) mile of the well contains an underground source of drinking water.

(3) Wells used by generators of hazardous waste or owners or operators of hazardous waste management facilities to dispose of hazardous waste, which cannot be classified under § 146.05(a)(1) or § 146.05(d) (1) and (2) (e.g., wells used to dispose of hazardous wastes into or above a formation which contains an aquifer which has been exempted pursuant to § 146.04).

(e) *Class V.* Injection wells not included in Class I, II, III, or IV. Class V wells include:

(1) Air conditioning return flow wells used to return to the supply aquifer the water used for heating or cooling in a heat pump;

(2) Cesspools including multiple dwelling, community or regional cesspools, or other devices that receive wastes which have an open bottom

and sometimes have perforated sides. The UIC requirements do not apply to single family residential cesspools nor to non-residential cesspools which receive solely sanitary wastes and have the capacity to serve fewer than 20 persons a day.

(3) Cooling water return flow wells used to inject water previously used for cooling;

(4) Drainage wells used to drain surface fluid, primarily storm runoff, into a subsurface formation;

(5) Dry wells used for the injection of wastes into a subsurface formation;

(6) Recharge wells used to replenish the water in an aquifer;

(7) Salt water intrusion barrier wells used to inject water into a fresh water aquifer to prevent the intrusion of salt water into the fresh water;

(8) Sand backfill and other backfill wells used to inject a mixture of water and sand, mill tailings or other solids into mined out portions of subsurface mines whether what is injected is a radioactive waste or not.

(9) Septic system wells used to inject the waste or effluent from a multiple dwelling, business establishment, community or regional business establishment septic tank. The UIC requirements do not apply to single family residential septic system wells, nor to non-residential septic system wells which are used solely for the disposal of sanitary waste and have the capacity to serve fewer than 20 persons a day.

(10) Subsidence control wells (not used for the purpose of oil or natural gas production) used to inject fluids into a non-oil or gas producing zone to reduce or eliminate subsidence associated with the overdraft of fresh water;

(11) Radioactive waste disposal wells other than Class IV;

(12) Injection wells associated with the recovery of geothermal energy for heating, aquaculture and production of electric power.

(13) Wells used for solution mining of conventional mines such as stopes leaching;

(14) Wells used to inject spent brine into the same formation from which it was withdrawn after extraction of halogens or their salts;

(15) Injection wells used in experimental technologies.

(16) Injection wells used for in situ recovery of lignite, coal, tar sands, and oil shale.

[45 FR 42500, June 24, 1980, as amended at 46 FR 43161, Aug. 27, 1981; 47 FR 4999, Feb. 3, 1982]

§ 146.6 Area of review.

The area of review for each injection well or each field, project or area of the State shall be determined according to either paragraph (a) or (b) of this section. The Director may solicit input from the owners or operators of injection wells within the State as to which method is most appropriate for each geographic area or field.

(a) *Zone of endangering influence.* (1) The zone of endangering influence shall be:

(i) In the case of application(s) for well permit(s) under § 122.38 that area the radius of which is the lateral distance in which the pressures in the injection zone may cause the migration of the injection and/or formation fluid into an underground source of drinking water; or

(ii) In the case of an application for an area permit under § 122.39, the project area plus a circumscribing area the width of which is the lateral distance from the perimeter of the project area, in which the pressures in the injection zone may cause the migration of the injection and/or formation fluid into an underground source of drinking water.

(2) Computation of the zone of endangering influence may be based upon the parameters listed below and should be calculated for an injection time period equal to the expected lif of the injection well or pattern. Th following modified Theis equation illustrates one form which the mathematical model may take.

$$r = \left(\frac{2.25KHt}{S10^x} \right)^{1/2}$$

where:

$$X = \frac{4\pi KH(h_w - h_{bo} \times S_pG_b)}{2.3Q}$$

r=Radius of endangering influence from injection well (length)
k=Hydraulic conductivity of the injection zone (length/time)
H=Thickness of the injection zone (length)
t=Time of injection (time)
S=Storage coefficient (dimensionless)
Q=Injection rate (volume/time)
h_{bo}=Observed original hydrostatic head of injection zone (length) measured from the base of the lowermost underground source of drinking water
h_w=Hydrostatic head of underground source of drinking water (length) measured from the base of the lowest underground source of drinking water
S_pG_b=Specific gravity of fluid in the injection zone (dimensionless)
π=3.142 (dimensionless)

The above equation is based on the following assumptions:

(i) The injection zone is homogenous and isotropic;

(ii) The injection zone has infinite area extent;

(iii) The injection well penetrates the entire thickness of the injection zone;

(iv) The well diameter is infinitesimal compared to "r" when injection time is longer than a few minutes; and

(v) The emplacement of fluid into the injection zone creates instantaneous increase in pressure.

(b) *Fixed radius.* (1) In the case of application(s) for well permit(s) under § 122.38 a fixed radius around the well of not less than one-fourth (¼) mile may be used.

(2) In the case of an application for an area permit under § 122.39 a fixed width of not less than one-fourth (¼) mile for the circumscribing area may be used.

In determining the fixed radius, the following factors shall be taken into consideration: Chemistry of injected and formation fluids; hydrogeology; population and ground-water use and dependence; and historical practices in the area.

(c) If the area of review is determined by a mathematical model pursuant to paragraph (a) of this section, the permissible radius is the result of such calculation even if it is less than one-fourth (¼) mile.

[45 FR 42500, June 24, 1980, as amended at 46 FR 43161, Aug. 27, 1981; 47 FR 4999, Feb. 3, 1982]

§ 146.7 Corrective action.

In determining the adequacy of corrective action proposed by the applicant under 40 CFR 144.55 and in determining the additional steps needed to prevent fluid movement into underground sources of drinking water, the following criteria and factors shall be considered by the Director:

(a) Nature and volume of injected fluid;

(b) Nature of native fluids or byproducts of injection;

(c) Potentially affected population;

(d) Geology;

(e) Hydrology;

(f) History of the injection operation;

(g) Completion and plugging records;

(h) Abandonment procedures in effect at the time the well was abandoned; and

(i) Hydraulic connections with underground sources of drinking water.

(Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act: 42 U.S.C. 6905, 6912, 6925, 6927, 6974)

[45 FR 42500, June 24, 1980, as amended at 46 FR 43162, Aug. 27, 1981; 48 FR 14293, Apr. 1, 1983]

§ 146.8 Mechanical integrity.

(a) An injection well has mechanical integrity if:

(1) There is no significant leak in the casing, tubing or packer; and

(2) There is no significant fluid movement into an underground source of drinking water through vertical channels adjacent to the injection well bore.

(b) One of the following methods must be used to evaluate the absence of significant leaks under paragraph (a)(1) of this section:

(1) Monitoring of annulus pressure; or

(2) Pressure test with liquid or gas; or

(3) Records of monitoring showing the absence of significant changes in

the relationship between injection pressure and injection flow rate for the following Class II enhanced recovery wells:

(i) Existing wells completed without a packer provided that a pressure test has been performed and the data is available and provided further that one pressure test shall be performed at a time when the well is shut down and if the running of such a test will not cause further loss of significant amounts of oil or gas; or

(ii) Existing wells constructed without a long string casing, but with surface casing which terminates at the base of fresh water provided that local geological and hydrological features allow such construction and provided further that the annular space shall be visually inspected. For these wells, the Director shall prescribe a monitoring program which will verify the absence of significant fluid movement from the injection zone into an USDW.

(c) One of the following methods must be used to determine the absence of significant fluid movement under paragraph (a)(2) of this section:

(1) The results of a temperature or noise log; or

(2) For Class II only, cementing records demonstrating the presence of adequate cement to prevent such migration; or

(3) For Class III wells where the nature of the casing precludes the use of the logging techniques prescribed at paragraph (c)(1) of this section, cementing records demonstrating the presence of adequate cement to prevent such migration;

(4) For Class III wells where the Director elects to rely on cementing records to demonstrate the absence of significant fluid movement, the monitoring program prescribed by § 146.33(b) shall be designed to verify the absence of significant fluid movement.

(d) The Director may allow the use of a test to demonstrate mechanical integrity other than those listed in paragraphs (b) and (c)(2) of this section with the written approval of the Administrator. To obtain approval, the Director shall submit a written request to the Administrator, which shall set forth the proposed test and all technical data supporting its use. The Administrator shall approve the request if it will reliably demonstrate the mechanical integrity of wells for which its use is proposed. Any alternate method approved by the Administrator shall be published in the Federal Register and may be used in all States unless its use is restricted at the time of approval by the Administrator.

(e) In conducting and evaluating the tests enumerated in this section or others to be allowed by the Director, the owner or operator and the Director shall apply methods and standards generally accepted in the industry. When the owner or operator reports the results of mechanical integrity tests to the Director, he shall include a description of the test(s) and the method(s) used. In making his/her evaluation, the Director shall review monitoring and other test data submitted since the previous evaluation.

[45 FR 42500, June 24, 1980, as amended at 46 FR 43162, Aug. 27, 1981; 47 FR 4999, Feb. 3, 1982]

§ 146.9 Criteria for establishing permitting priorities.

In determining priorities for setting times for owners or operators to submit applications for authorization to inject under the procedures of § 144.31 (a), (c), (g) or § 144.22(f), the Director shall base these priorities upon consideration of the following factors:

(a) Injection wells known or suspected to be contaminating underground sources of drinking water;

(b) Injection wells known to be injecting fluids containing hazardous contaminants;

(c) Likelihood of contamination of underground sources of drinking water;

(d) Potentially affected population;

(e) Injection wells violating existing State requirements;

(f) Coordination with the issuance of permits required by other State or Federal permit programs;

(g) Age and depth of the injection well; and

(h) Expiration dates of existing State permits, if any.

(Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act: 42 U.S.C. 6905, 6912, 6925, 6927, 6974)

[45 FR 42500, June 24, 1980, as amended at 48 FR 14293, Apr. 1, 1983]

§ 146.10 Plugging and abandoning Class I-III wells.

(a) Prior to abandoning Class I to III wells the well shall be plugged with cement in a manner which will not allow the movement of fluids either into or between underground sources of drinking water. The Director may allow Class III wells to use other plugging materials if he is satisfied that such materials will prevent movement of fluids into or between underground sources of drinking water.

(b) Placement of the cement plugs shall be accomplished by one of the following:

(1) The Balance method;

(2) The Dump Bailer method;

(3) The Two-Plug method; or

(4) An alternative method approved by the Director, which will reliably provide a comparable level of protection to underground sources of drinking water.

(c) The well to be abandoned shall be in a state of static equilibrium with the mud weight equalized top to bottom, either by circulating the mud in the well at least once or by a comparable method prescribed by the Director, prior to the placement of the cement plug(s).

(d) The plugging and abandonment plan required in 40 CFR 144.52(a)(6) and 144.51(n) shall, in the case of a Class III project which underlies or is in an aquifer which has been exempted under 40 CFR 146.04, also demonstrate adequate protection of USDWs. The Director shall prescribe aquifer cleanup and monitoring where he deems it necessary and feasible to insure adequate protection of USDWs.

(Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act: 42 U.S.C. 6905, 6912, 6925, 6927, 6974)

[45 FR 42500, June 24, 1980, as amended at 47 FR 5000, Feb. 3, 1982; 48 FR 14293, Apr. 1, 1983]

Subpart B—Criteria and Standards Applicable to Class I Wells

§ 146.11 Criteria and standards applicable to Class I nonhazardous wells.

This subpart establishes criteria and standards for underground injection control programs to regulate Class I nonhazardous wells.

[53 FR 28148, July 26, 1988]

§ 146.12 Construction requirements.

(a) All Class I wells shall be sited in such a fashion that they inject into a formation which is beneath the lowermost formation containing, within one quarter mile of the well bore, an underground source of drinking water.

(b) All Class I wells shall be cased and cemented to prevent the movement of fluids into or between underground sources of drinking water. The casing and cement used in the construction of each newly drilled well shall be designed for the life expectancy of the well. In determining and specifying casing and cementing requirements, the following factors shall be considered:

(1) Depth to the injection zone;

(2) Injection pressure, external pressure, internal pressure, and axial loading;

(3) Hole size;

(4) Size and grade of all casing strings (wall thickness, diameter, nominal weight, length, joint specification, and construction material);

(5) Corrosiveness of injected fluid, formation fluids, and temperatures;

(6) Lithology of injection and confining intervals; and

(7) Type or grade of cement.

(c) All Class I injection wells, except those municipal wells injecting noncorrosive wastes, shall inject fluids through tubing with a packer set immediately above the injection zone, or tubing with an approved fluid seal as an alternative. The tubing, packer, and fluid seal shall be designed for the expected service.

(1) The use of other alternatives to a packer may be allowed with the written approval of the Director. To obtain approval, the operator shall submit a written request to the Director, which shall set forth the proposed

alternative and all technical data supporting its use. The Director shall approve the request if the alternative method will reliably provide a comparable level of protection to underground sources of drinking water. The Director may approve an alternative method solely for an individual well or for general use.

(2) In determining and specifying requirements for tubing, packer, or alternatives the following factors shall be considered:

(i) Depth of setting;

(ii) Characteristics of injection fluid (chemical content, corrosiveness, and density);

(iii) Injection pressure;

(iv) Annular pressure;

(v) Rate, temperature and volume of injected fluid; and

(vi) Size of casing.

(d) Appropriate logs and other tests shall be conducted during the drilling and construction of new Class I wells. A descriptive report interpreting the results of such logs and tests shall be prepared by a knowledgeable log analyst and submitted to the Director. At a minimum, such logs and tests shall include:

(1) Deviation checks on all holes constructed by first drilling a pilot hole, and then enlarging the pilot hole by reaming or another method. Such checks shall be at sufficiently frequent intervals to assure that vertical avenues for fluid migration in the form of diverging holes are not created during drilling.

(2) Such other logs and tests as may be needed after taking into account the availability of similar data in the area of the drilling site, the construction plan, and the need for additional information, that may arise from time to time as the construction of the well progresses. In determining which logs and tests shall be required, the following logs shall be considered for use in the following situations:

(i) For surface casing intended to protect underground sources of drinking water:

(A) Resistivity, spontaneous potential, and caliper logs before the casing is installed; and

(B) A cement bond, temperature, or density log after the casing is set and cemented.

(ii) For intermediate and long strings of casing intended to facilitate injection:

(A) Resistivity, spontaneous potential, porosity, and gamma ray logs before the casing is installed;

(B) Fracture finder logs; and

(C) A cement bond, temperature, or density log after the casing is set and cemented.

(e) At a minimum, the following information concerning the injection formation shall be determined or calculated for new Class I wells:

(1) Fluid pressure;

(2) Temperature;

(3) Fracture pressure;

(4) Other physical and chemical characteristics of the injection matrix; and

(5) Physical and chemical characteristics of the formation fluids.

[45 FR 42500, June 24, 1980, as amended at 46 FR 43162, Aug. 27, 1981]

§ 146.13 Operating, monitoring and reporting requirements.

(a) *Operating requirements*. Operating requirements shall, at a minimum, specify that:

(1) Except during stimulation injection pressure at the wellhead shall not exceed a maximum which shall be calculated so as to assure that the pressure in the injection zone during injection does not initiate new fractures or propagate existing fractures in the injection zone. In no case shall injection pressure initiate fractures in the confining zone or cause the movement of injection or formation fluids into an underground source of drinking water.

(2) Injection between the outermost casing protecting underground sources of drinking water and the well bore is prohibited.

(3) Unless an alternative to a packer has been approved under § 146.12(c), the annulus between the tubing and the long string of casings shall be filled with a fluid approved by the Director and a pressure, also approved by the Director, shall be maintained on the annulus.

(b) *Monitoring requirements.* Moni- oring requirements shall, at a mini- num, include:

(1) The analysis of the injected luids with sufficient frequency to ield representative data of their char- cteristics;

(2) Installation and use of continu- us recording devices to monitor injec- ion pressure, flow rate and volume, nd the pressure on the annulus be- ween the tubing and the long string f casing;

(3) A demonstration of mechanical ntegrity pursuant to § 146.8 at least nce every five years during the life of he well; and

(4) The type, number and location of vells within the area of review to be ised to monitor any migration of luids into and pressure in the under- round sources of drinking water, the arameters to be measured and the requency of monitoring.

(c) *Reporting requirements.* Report- ng requirements shall, at a minimum, nclude:

(1) Quarterly reports to the Director on:

(i) The physical, chemical and other relevant characteristics of injection fluids;

(ii) Monthly average, maximum and minimum values for injection pressure, flow rate and volume, and annular pressure; and

(iii) The results of monitoring prescribed under paragraph (b)(4) of this section.

(2) Reporting the results, with the first quarterly report after the completion, of:

(i) Periodic tests of mechanical integrity;

(ii) Any other test of the injection well conducted by the permittee if required by the Director; and

(iii) Any well work over.

(d) *Ambient monitoring.* (1) Based on a site-specific assessment of the potential for fluid movement from the well or injection zone and on the potential value of monitoring wells to detect such movement, the Director shall require the owner or operator to develop a monitoring program. At a minimum, the Director shall require monitoring of the pressure buildup in the injection zone annually, including at a minimum, a shut down of the well for a time sufficient to conduct a valid observation of the pressure fall-off curve.

(2) When prescribing a monitoring system the Director may also require:

(i) Continuous monitoring for pressure changes in the first aquifer overlying the confining zone. When such a well is installed, the owner or operator shall, on a quarterly basis, sample the aquifer and analyze for constituents specified by the Director;

(ii) The use of indirect, geophysical techniques to determine the position of the waste front, the water quality in a formation designated by the Director, or to provide other site specific data;

(iii) Periodic monitoring of the ground water quality in the first aquifer overlying the injection zone;

(iv) Periodic monitoring of the ground water quality in the lowermost USDW; and

(v) Any additional monitoring necessary to determine whether fluids are moving into or between USDWs.

(Approved by the Office of Management and Budget under control number 2000-0456)

[45 FR 42500, June 24, 1980, as amended at 46 FR 43162, Aug. 27, 1981; 47 FR 32129, July 26, 1982; 53 FR 28148, July 26, 1988]

§ 146.14 Information to be considered by the Director.

This section sets forth the information which must be considered by the Director in authorizing Class I wells. For an existing or converted new Class I well the Director may rely on the existing permit file for those items of information listed below which are current and accurate in the file. For a newly drilled Class I well, the Director shall require the submission of all the information listed below. For both existing and new Class I wells certain maps, cross-sections, tabulations of wells within the area of review and other data may be included in the application by reference provided they are current, readily available to the Director (for example, in the permitting agency's files) and sufficiently identified to be retrieved. In cases where EPA issues the permit all the information in this section must be submitted to the Administrator.

(a) Prior to the issuance of a permit for an existing Class I well to operate or the construction or conversion of a new Class I well the Director shall consider the following:

(1) Information required in 40 CFR 144.31 and 144.31(g);

(2) A map showing the injection well(s) for which a permit is sought and the applicable area of review. Within the area of review, the map must show the number, or name, and location of all producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, mines (surface and subsurface), quarries, water wells and other pertinent surface features including residences and roads. The map should also show faults, if known or suspected. Only information of public record is required to be included on this map;

(3) A tabulation of data on all wells within the area of review which penetrate into the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of plugging and/or completion, and any additional information the Director may require;

(4) Maps and cross sections indicating the general vertical and lateral limits of all underground sources of drinking water within the area of review, their position relative to the injection formation and the direction of water movement, where known, in each underground source of drinking water which may be affected by the proposed injection;

(5) Maps and cross sections detailing the geologic structure of the local area;

(6) Generalized maps and cross sections illustrating the regional geologic setting;

(7) Proposed operating data:

(i) Average and maximum daily rate and volume of the fluid to be injected;

(ii) Average and maximum injection pressure; and

(iii) Source and an analysis of the chemical, physical, radiological and biological characteristics of injection fluids;

(8) Proposed formation testing program to obtain an analysis of the chemical, physical and radiological characteristics of and other information on the receiving formation;

(9) Proposed stimulation program;

(10) Proposed injection procedure;

(11) Schematic or other appropriate drawings of the surface and subsurface construction details of the well.

(12) Contingency plans to cope with all shut-ins or well failures so as to prevent migration of fluids into any underground source of drinking water;

(13) Plans (including maps) for meeting the monitoring requirements in § 146.13(b);

(14) For wells within the area of review which penetrate the injection zone but are not properly completed or plugged, the corrective action proposed to be taken under 40 CFR 144.55;

(15) Construction procedures including a cementing and casing program logging procedures, deviation checks and a drilling, testing, and coring program; and

(16) A certificate that the applican has assured, through a performanc bond or other appropriate means, th resources necessary to close, plug o abandon the well as required by 4 CFR 122.42(g).

(b) Prior to granting approval fo the operation of a Class I well the D rector shall consider the following i formation:

(1) All available logging and testin program data on the well;

(2) A demonstration of mechanic integrity pursuant to § 146.8;

(3) The anticipated maximum pre sure and flow rate at which the pe mittee will operate;

(4) The results of the formation tes ing program;

(5) The actual injection procedure;

(6) The compatibility of injecte waste with fluids in the injection zo and minerals in both the injectio zone and the confining zone; and

(7) The status of corrective action o defective wells in the area of review.

(c) Prior to granting approval f the plugging and abandonment of Class I well the Director shall consid the following information:

(1) The type and number of plugs to be used;

(2) The placement of each plug including the elevation of the top and bottom;

(3) The type and grade and quantity of cement to be used;

(4) The method for placement of the plugs; and

(5) The procedure to be used to meet the requirements of § 146.10(c).

(Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act: 42 U.S.C. 6905, 6912, 6925, 6927, 6974)

[45 FR 42500, June 24, 1980, as amended at 46 FR 43162, Aug. 27, 1981; 48 FR 14293, Apr. 1, 1983]

§ 146.15 Mid-course evaluation requirements.

In compliance with 40 CFR 122.18(c)(4)(c)(ii) the data to be submitted on each Class I permit at six month intervals during the first two years of operation of the State program shall at a minimum include the following:

(a) The data required in § 146.14(a)(1);

(b) The data required in § 146.14(a)(3) including, under location, the distance and direction from the injection well;

(c) The depth to the top and bottom of any USDW;

(d) The distance to the nearest down-gradient water supply well;

(e) A description of the geology and hydrology of the area;

(f) The construction characteristics of the well;

(g) The corrective action proposed as well as that performed;

(h) The type and results of all mechanical integrity tests reported to the Director; and

(i) Any reporting to the Director under § 144.51(l)(6).

(Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act: 42 U.S.C. 6905, 6912, 6925, 6927, 6974)

[45 FR 42500, June 24, 1980, as amended at 48 FR 14293, Apr. 1, 1983]

Subpart C—Criteria and Standards Applicable to Class II Wells

§ 146.21 Applicability.

This subpart establishes criteria and standards for underground injection control programs to regulate Class II wells.

§ 146.22 Construction requirements.

(a) All new Class II wells shall be sited in such a fashion that they inject into a formation which is separated from any USDW by a confining zone that is free of known open faults or fractures within the area of review.

(b)(1) All Class II injection wells shall be cased and cemented to prevent movement of fluids into or between underground sources of drinking water. The casing and cement used in the construction of each newly drilled well shall be designed for the life expectancy of the well. In determining and specifying casing and cementing requirements, the following factors shall be considered:

(i) Depth to the injection zone;

(ii) Depth to the bottom of all USDWs; and

(iii) Estimated maximum and average injection pressures;

(2) In addition the Director may consider information on:

(i) Nature of formation fluids;

(ii) Lithology of injection and confining zones;

(iii) External pressure, internal pressure, and axial loading;

(iv) Hole size;

(v) Size and grade of all casing strings; and

(vi) Class of cement.

(c) The requirements in paragraph (b) of this section need not apply to existing or newly converted Class II wells located in existing fields if:

(1) Regulatory controls for casing and cementing existed for those wells at the time of drilling and those wells are in compliance with those controls; and

(2) Well injection will not result in the movement of fluids into an underground source of drinking water so as to create a significant risk to the health of persons.

(d) The requirements in paragraph (b) of this section need not apply to newly drilled wells in existing fields if:

(1) They meet the requirements of the State for casing and cementing applicable to that field at the time of submission of the State program to the Administrator; and

(2) Well injection will not result in the movement of fluids into an underground source of drinking water so as to create a significant risk to the health of persons.

(e) Where a State did not have regulatory controls for casing and cementing prior to the time of the submission of the State program to the Administrator, the Director need not apply the casing and cementing requirements in paragraph (b) of this section if he submits as a part of his application for primacy, an appropriate plan for casing and cementing of existing, newly converted, and newly drilled wells in existing fields, and the Administrator approves the plan.

(f) Appropriate logs and other tests shall be conducted during the drilling and construction of new Class II wells. A descriptive report interpreting the results of that portion of those logs and tests which specifically relate to (1) an USDW and the confining zone adjacent to it, and (2) the injection and adjacent formations shall be prepared by a knowledgeable log analyst and submitted to the Director. At a minimum, these logs and tests shall include:

(1) Deviation checks on all holes constructed by first drilling a pilot hole and then enlarging the pilot hole, by reaming or another method. Such checks shall be at sufficiently frequent intervals to assure that vertical avenues for fluid movement in the form of diverging holes are not created during drilling.

(2) Such other logs and tests as may be needed after taking into account the availability of similar data in the area of the drilling site, the construction plan, and the need for additional information that may arise from time to time as the construction of the well progresses. In determining which logs and tests shall be required the following shall be considered by the Director in setting logging and testing requirements:

(i) For surface casing intended to protect underground sources of drinking water in areas where the lithology has not been determined:

(A) Electric and caliper logs before casing is installed; and

(B) A cement bond, temperature, or density log after the casing is set and cemented.

(ii) For intermediate and long strings of casing intended to facilitate injection:

(A) Electric, porosity and gamma ray logs before the casing is installed;

(B) Fracture finder logs; and

(C) A cement bond, temperature, or density log after the casing is set and cemented.

(g) At a minimum, the following information concerning the injection formation shall be determined or calculated for new Class II wells or projects:

(1) Fluid pressure;

(2) Estimated fracture pressure;

(3) Physical and chemical characteristics of the injection zone.

[45 FR 42500, June 24, 1980, as amended at 46 FR 43162, Aug. 27, 1981; 47 FR 5000, Feb. 3, 1982]

§ 146.23 Operating, monitoring, and reporting requirements.

(a) *Operating requirements.* Operating requirements shall, at a minimum, specify that:

(1) Injection pressure at the wellhead shall not exceed a maximum which shall be calculated so as to assure that the pressure during injection does not initiate new fractures o propagate existing fractures in the confining zone adjacent to the USDWs. In no case shall injectio pressure cause the movement of injec tion or formation fluids into an under ground source of drinking water.

(2) Injection between the outermos casing protecting underground source of drinking water and the well bor shall be prohibited.

(b) *Monitoring requirements.* Mon toring requirements shall, at a min mum, include:

(1) Monitoring of the nature of i jected fluids at time intervals suff

ciently frequent to yield data representative of their characteristics;

(2) Observation of injection pressure, flow rate, and cumulative volume at least with the following frequencies:

(i) Weekly for produced fluid disposal operations;

(ii) Monthly for enhanced recovery operations;

(iii) Daily during the injection of liquid hydrocarbons and injection for withdrawal of stored hydrocarbons; and

(iv) Daily during the injection phase of cyclic steam operations;

And recording of one observation of injection pressure, flow rate and cumulative volume at reasonable intervals no greater than 30 days.

(3) A demonstration of mechanical integrity pursuant to § 146.8 at least once every five years during the life of the injection well;

(4) Maintenance of the results of all monitoring until the next permit review (see 40 CFR 144.52(a)(5)); and

(5) Hydrocarbon storage and enhanced recovery may be monitored on a field or project basis rather than on an individual well basis by manifold monitoring. Manifold monitoring may be used in cases of facilities consisting of more than one injection well, operating with a common manifold. Separate monitoring systems for each well are not required provided the owner/operator demonstrates that manifold monitoring is comparable to individual well monitoring.

(c) *Reporting requirements.* (1) Reporting requirements shall at a minimum include an annual report to the Director summarizing the results of monitoring required under paragraph (b) of this section. Such summary shall include monthly records of injected fluids, and any major changes in characteristics or sources of injected fluid. Previously submitted information may be included by reference.

(2) Owners or operators of hydrocarbon storage and enhanced recovery projects may report on a field or project basis rather than an individual well basis where manifold monitoring is used.

(Approved by the Office of Management and Budget under control number 2000-0456)

(Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act: 42 U.S.C. 6905, 6912, 6925, 6927, 6974)

[45 FR 42500, June 24, 1980, as amended at 46 FR 43162, Aug. 27, 1981; 47 FR 5000, Feb. 3, 1982; 48 FR 14293, Apr. 1, 1983; 48 FR 31404, July 8, 1983]

§ 146.24 Information to be considered by the Director.

This section sets forth the information which must be considered by the Director in authorizing Class II wells. Certain maps, cross-sections, tabulations of wells within the area of review, and other data may be included in the application by reference provided they are current, readily available to the Director (for example, in the permitting agency's files) and sufficiently identified to be retrieved. In cases where EPA issues the permit, all the information in this section is to be submitted to the Administrator.

(a) Prior to the issuance of a permit for an existing Class II well to operate or the construction or conversion of a new Class II well the Director shall consider the following:

(1) Information required in 40 CFR 144.31 and 144.31(g);

(2) A map showing the injection well or project area for which a permit is sought and the applicable area of review. Within the area of review, the map must show the number or name and location of all existing producing wells, injection wells, abandoned wells, dry holes, and water wells. The map may also show surface bodies of waters, mines (surface and subsurface), quarries and other pertinent surface features including residences and roads, and faults if known or suspended. Only information of public record and pertinent information known to the applicant is required to be included on this map. This requirement does not apply to existing Class II wells; and

(3) A tabulation of data reasonably available from public records or otherwise known to the applicant on all wells within the area of review included on the map required under paragraph (a)(2) of this section which penetrate the proposed injection zone or, in the case of Class II wells operating

best copy available

over the fracture pressure of the injection formation, all known wells within the area of review which penetrate formations affected by the increase in pressure. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of plugging and completion, and any additional information the Director may require. In cases where the information would be repetitive and the wells are of similar age, type, and construction the Director may elect to only require data on a representative number of wells. This requirement does not apply to existing Class II wells.

(4) Proposed operating data:

(i) Average and maximum daily rate and volume of fluids to be injected;

(ii) Average and maximum injection pressure; and

(iii) Source and an appropriate analysis of the chemical and physical characteristics of the injection fluid.

(5) Appropriate geological data on the injection zone and confining zone including lithologic description, geological name, thickness and depth;

(6) Geologic name and depth to bottom of all underground sources of drinking water which may be affected by the injection;

(7) Schematic or other appropriate drawings of the surface and subsurface construction details of the well;

(8) In the case of new injection wells the corrective action proposed to be taken by the applicant under 40 CFR 122.44;

(9) A certificate that the applicant has assured through a performance bond or other appropriate means, the resources necessary to close, plug or abandon the well as required by 40 CFR 122.42(g);

(b) In addition the Director may consider the following:

(1) Proposed formation testing program to obtain the information required by § 146.22(g);

(2) Proposed stimulation program;

(3) Proposed injection procedure;

(4) Proposed contingency plans, if any, to cope with well failures so as to prevent migration of contaminating fluids into an underground source of drinking water;

(5) Plans for meeting the monitoring requirements of § 146.23(b).

(c) Prior to granting approval for the operation of a Class II well the Director shall consider the following information:

(1) All available logging and testing program data on the well;

(2) A demonstration of mechanical integrity pursuant to § 146.8;

(3) The anticipated maximum pressure and flow rate at which the permittee will operate.

(4) The results of the formation testing program;

(5) The actual injection procedure; and

(6) For new wells the status of corrective action on defective wells in the area of review.

(d) Prior to granting approval for the plugging and abandonment of a Class II well the Director shall consider the following information:

(1) The type, and number of plugs to be used;

(2) The placement of each plug including the elevation of top and bottom;

(3) The type, grade, and quantity of cement to be used;

(4) The method of placement of the plugs; and

(5) The procedure to be used to meet the requirements of § 146.10(c).

(Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act: 42 U.S.C. 6905, 6912, 6925, 6927, 6974)

[45 FR 42500, June 24, 1980, as amended at 46 FR 43162, Aug. 27, 1981; 47 FR 5000, Feb. 3, 1982; 48 FR 14293, Apr. 1, 1983]

§ 146.25 Mid-course evaluation requirements.

(a) In compliance with 40 CFR 144.9(b)(2) the data to be submitted on each new Class II permit at six months intervals during the first two years of operation of the State program shall at a minimum include the following:

(1) The data required in § 146.24(a)(1);

(2) The data required in § 146.24(a)(3) including, under location, the distance and direction from the injection well;

(3) The depth to the top and bottom of any USDW;

(4) The distance to the nearest down-gradient water supply well;

(5) A description of the geology and hydrology of the area;

(6) The construction characteristics of the well;

(7) The corrective action proposed as well as that performed; and

(8) Any reporting to the Director under § 144.51(l)(6).

(b) The Director shall also submit the type and results of all Mechanical Integrity tests reported on existing wells and new (conversion only) wells during the first two years of operation.

(c) The Director shall require a temperature log or noise log, on a sample of Class II wells in cases where operators submitted cementing records to meet the requirement of § 146.8(c). The wells to be tested shall be chosen by a formal random selection procedure. The sampling shall be done on a field or pool basis and be statistically representative of the wells in that field or pool. At a minimum, the sample size for each State shall be 100 wells or 5 percent of the number of Class II injection wells in the State whichever is smaller. At least half of the wells tested must be existing wells.

(Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act: 42 U.S.C. 6905, 6912, 6925, 6927, 6974)

[45 FR 42500, June 24, 1980, as amended at 48 FR 14293, Apr. 1, 1983]

Subpart D—Criteria and Standards Applicable to Class III Wells

§ 146.31 Applicability.

This subpart establishes criteria and standards for underground injection control programs to regulate Class III wells.

§ 146.32 Construction requirements.

(a) All new Class III wells shall be cased and cemented to prevent the migration of fluids into or between underground sources of drinking water. The Director may waive the cementing requirement for new wells in existing projects or portions of existing projects where he has substantial evidence that no contamination of underground sources of drinking water would result. The casing and cement used in the construction of each newly drilled well shall be designed for the life expectancy of the well. In determining and specifying casing and cementing requirements, the following factors shall be considered:

(1) Depth to the injection zone;

(2) Injection pressure, external pressure, internal pressure, axial loading, etc.;

(3) Hole size;

(4) Size and grade of all casing strings (wall thickness, diameter, nominal weight, length, joint specification, and construction material);

(5) Corrosiveness of injected fluids and formation fluids;

(6) Lithology of injection and confining zones; and

(7) Type and grade of cement.

(b) Appropriate logs and other tests shall be conducted during the drilling and construction of new Class III wells. A descriptive report interpreting the results of such logs and tests shall be prepared by a knowledgeable log analyst and submitted to the Director. The logs and tests appropriate to each type of Class III well shall be determined based on the intended function, depth, construction and other characteristics of the well, availability of similar data in the area of the drilling site and the need for additional information that may arise from time to time as the construction of the well progresses. Deviation checks shall be conducted on all holes where pilot holes and reaming are used, unless the hole will be cased and cemented by circulating cement to the surface. Where deviation checks are necessary they shall be conducted at sufficiently frequent intervals to assure that vertical avenues for fluid migration in the form of diverging holes are not created during drilling.

(c) Where the injection zone is a formation which is naturally water-bearing the following information concerning the injection zone shall be determined or calculated for new Class III wells or projects:

(1) Fluid pressure;

(2) Fracture pressure; and

(3) Physical and chemical charateristics of the formation fluids.

(d) Where the injection formation is not a water-bearing formation, the information in paragraph (c)(2) of this section must be submitted.

(e) Where injection is into a formation which contains water with less than 10,000 mg/l TDS monitoring wells shall be completed into the injection zone and into any underground sources of drinking water above the injection zone which could be affected by the mining operation. These wells shall be located in such a fashion as to detect any excursion of injection fluids, process by-products, or formation fluids outside the mining area or zone. If the operation may be affected by subsidence or catastrophic collapse the monitoring wells shall be located so that they will not be physically affected.

(f) Where injection is into a formation which does not contain water with less than 10,000 mg/l TDS, no monitoring wells are necessary in the injection stratum.

(g) Where the injection wells penetrate an USDW in an area subject to subsidence or catastrophic collapse an adequate number of monitoring wells shall be completed into the USDW to detect any movement of injected fluids, process by-products or formation fluids into the USDW. The monitoring wells shall be located outside the physical influence of the subsidence or catastrophic collapse.

(h) In determining the number, location, construction and frequency of monitoring of the monitoring wells the following criteria shall be considered:

(1) The population relying on the USDW affected or potentially affected by the injection operation;

(2) The proximity of the injection operation to points of withdrawal of drinking water;

(3) The local geology and hydrology;

(4) The operating pressures and whether a negative pressure gradient is being maintained;

(5) The nature and volume of the injected fluid, the formation water, and the process by-products; and

(6) The injection well density.

[45 FR 42500, June 24, 1980, as amended at 46 FR 43163, Aug. 27, 1981; 47 FR 5000, Feb. 3, 1982]

§ 146.33 Operating, monitoring, and reporting requirements.

(a) *Operating requirements.* Operating requirements prescribed shall, at a minimum, specify that:

(1) Except during well stimulation injection pressure at the wellhead shall be calculated so as to assure that the pressure in the injection zone during injection does not initiate new fractures or propagate existing fractures in the injection zone. In no case, shall injection pressure initiate fractures in the confining zone or cause the migration of injection or formation fluids into an underground source of drinking water.

(2) Injection between the outermost casing protecting underground sources of drinking water and the well bore is prohibited.

(b) *Monitoring requirements.* Monitoring requirements shall, at a minimum, specify:

(1) Monitoring of the nature of injected fluids with sufficient frequency to yield representative data on its characteristics. Whenever the injection fluid is modified to the extent that the analysis required by § 146.34(a)(7)(iii) is incorrect or incomplete, a new analysis as required by § 146.34(a)(7)(iii) shall be provided to the Director.

(2) Monitoring of injection pressure and either flow rate or volume semi-monthly, or metering and daily recording of injected and produced fluid volumes as appropriate.

(3) Demonstration of mechanical integrity pursuant to § 146.08 at least once every five years during the life of the well for salt solution mining.

(4) Monitoring of the fluid level in the injection zone semi-monthly, where appropriate and monitoring of the parameters chosen to measure water quality in the monitoring wells required by § 146.32(e), semi-monthly.

(5) Quarterly monitoring of wells required by § 146.32(g).

(6) All Class III wells may be monitored on a field or project basis rather than an individual well basis by manifold monitoring. Manifold monitoring

may be used in cases of facilities consisting of more than one injection well, operating with a common manifold. Separate monitoring systems for each well are not required provided the owner/operator demonstrates that manifold monitoring is comparable to individual well monitoring.

(c) *Reporting requirements.* Reporting requirements shall, at a minimum, include:

(1) Quarterly reporting to the Director on required monitoring;

(2) Results of mechanical integrity and any other periodic test required by the Director reported with the first regular quarterly report after the completion of the test; and

(3) Monitoring may be reported on a project or field basis rather than individual well basis where manifold monitoring is used.

(Approved by the Office of Management and Budget under control number 2000-0456)

[45 FR 42500, June 24, 1980, as amended at 46 FR 43163, Aug. 27, 1981; 47 FR 5001, Feb. 3, 1982; 48 FR 31404, July 8, 1983]

§ 146.34 Information to be considered by the Director.

This section sets forth the information which must be considered by the Director in authorizing Class III wells. Certain maps, cross sections, tabulations of wells within the area of review, and other data may be included in the application by reference provided they are current, readily available to the Director (for example, in the permitting agency's files) and sufficiently identified to be retrieved. In cases where EPA issues the permit, all the information in this section must be submitted to the Administrator.

(a) Prior to the issuance of a permit for an existing Class III well or area to operate or the construction of a new Class III well the Director shall consider the following:

(1) Information required in 40 CFR 144.31 and 144.31(g);

(2) A map showing the injection well or project area for which a permit is sought and the applicable area of review. Within the area of review, the map must show the number or name and location of all existing producing wells, injection wells, abandoned wells, dry holes, public water systems and water wells. The map may also show surface bodies of waters, mines (surface and subsurface) quarries and other pertinent surface features including residences and roads, and faults if known or suspected. Only information of public record and pertinent information known to the applicant is required to be included on this map.

(3) A tabulation of data reasonably available from public records or otherwise known to the applicant on wells within the area of review included on the map required under paragraph (a)(2) of this section which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of plugging and completion, and any additional information the Director may require. In cases where the information would be repetitive and the wells are of similar age, type, and construction the Director may elect to only require data on a representative number of wells.

(4) Maps and cross sections indicating the vertical limits of all underground sources of drinking water within the area of review, their position relative to the injection formation, and the direction of water movement, where known, in every underground source of drinking water which may be affected by the proposed injection;

(5) Maps and cross sections detailing the geologic structure of the local area;

(6) Generalized map and cross sections illustrating the regional geologic setting;

(7) Proposed operating data:

(i) Average and maximum daily rate and volume of fluid to be injected;

(ii) Average and maximum injection pressure; and

(iii) Qualitative analysis and ranges in concentrations of all constituents of injected fluids. The applicant may request Federal confidentiality as specified in 40 CFR Part 2. If the information is proprietary an applicant may, in lieu of the ranges in concentrations, choose to submit maximum concentrations which shall not be exceeded. In such a case the applicant shall retain records of the undisclosed concentrations and provide them upon request to the Director as part of any enforcement investigation.

(8) Proposed formation testing program to obtain the information required by § 146.32(c).

(9) Proposed stimulation program;

(10) Proposed injection procedure;

(11) Schematic or other appropriate drawings of the surface and subsurface construction details of the well;

(12) Plans (including maps) for meeting the monitoring requirements of § 146.33(b);

(13) Expected changes in pressure, native fluid displacement, direction of movement of injection fluid;

(14) Contingency plans to cope with all shut-ins or well failures so as to prevent the migration of contaminating fluids into underground sources of drinking water;

(15) A certificate that the applicant has assured, through a performance bond, or other appropriate means, the resources necessary to close, plug, or abandon the well as required by 40 CFR 144.52(a)(7) and

(16) The corrective action proposed to be taken under 40 CFR 144.55.

(b) Prior to granting approval for the operation of a Class III well the Director shall consider the following information:

(1) All available logging and testing data on the well;

(2) A satisfactory demonstration of mechanical integrity for all new wells and for all existing salt solution wells pursuant to § 146.08;

(3) The anticipated maximum pressure and flow rate at which the permittee will operate;

(4) The results of the formation testing program;

(5) The actual injection procedures; and

(6) The status of corrective action on defective wells in the area of review.

(c) Prior to granting approval for the plugging and abandonment of a Class III well the Director shall consider the following information:

(1) The type and number of plugs to be used;

(2) The placement of each plug including the elevation of the top and bottom;

(3) The type, grade and quantity of cement to be used;

(4) The method of placement of the plugs, and

(5) The procedure to be used to meet the requirements of § 146.10(c).

(Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act: 42 U.S.C. 6905, 6912, 6925, 6927, 6974)

[45 FR 42500, June 24, 1980, as amended at 46 FR 43163, Aug. 27, 1981; 47 FR 5001, Feb. 3, 1982; 48 FR 14293, Apr. 1, 1983]

§ 146.35 Mid-course evaluation requirements.

In compliance with 40 CFR 144.9(b)(2) the data to be submitted on each Class III permit at six month intervals during the first two years of operation of the State program shall at a minimum include the following:

(a) The data required in § 146.14(a)(i);

(b) The data required in § 146.34(a)(3) including, under location, the distance and direction from the injection well;

(c) The depth to the top and bottom of any USDW;

(d) The distance to the nearest down-gradient water supply well;

(e) A description of the geology and hydrology of the area;

(f) The construction characteristics of the well;

(g) The type and results of all mechanical integrity tests reported to the Director during the first two years of the program; and

(h) Any reporting to the Director under § 144.51(l)(6).

(Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act: 42 U.S.C. 6905, 6912, 6925, 6927, 6974)

[45 FR 42500, June 24, 1980, as amended at 48 FR 14293, Apr. 1, 1983]

Subpart E—Criteria and Standards Applicable to Class IV Injection Wells [Reserved]

Subpart F—Criteria and Standards Applicable to Class V Injection Wells

§ 146.51 Applicability.

This subpart sets forth criteria and standards for underground injection control programs to regulate all injection not regulated in Subparts B, C, D, and E.

(a) Generally, wells covered by this subpart inject non-hazardous fluids into or above formations that contain underground sources of drinking water. It includes all wells listed in § 146.5(e) but is not limited to those types of injection wells.

(b) It also includes wells not covered in Class IV that inject radioactive material listed in 10 CFR Part 20, Appendix B, Table II, Column 2.

[45 FR 42500, June 24, 1980, as amended at 47 FR 5001, Feb. 3, 1982]

§ 146.52 Inventory and assessment.

(a) The owner or operator of any Class V well shall, within one year of the effective date of an underground injection control program, notify the Director of the existence of any well meeting the definitions of Class V under his control, and submit the inventory information required in 40 CFR 144.26(a).

(b) Within three (3) years of approval of the State program the Director shall complete and submit to EPA a report containing:

(1) The information on the construction features of Class V wells, and the nature and volume of the injected fluids;

(2) An assessment of the contamination potential of the Class V wells using hydrogeological data available to the State;

(3) An assessment of the available corrective alternatives where appropriate and their environmental and economic consequences; and

(4) Recommendations both for the most appropriate regulatory approaches and for remedial actions where appropriate.

(Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act: 42 U.S.C. 6905, 6912, 6925, 6927, 6974)

[45 FR 42500, June 24, 1980, as amended at 48 FR 14293, Apr. 1, 1983]

Subpart G—Criteria and Standards Applicable to Class I Hazardous Waste Injection Wells

SOURCE: 53 FR 28148, July 26, 1988, unless otherwise noted.

§ 146.61 Applicability.

(a) This subpart establishes criteria and standards for underground injection control programs to regulate Class I hazardous waste injection wells. Unless otherwise noted this Subpart supplements the requirements of Subpart A and applies instead of Subpart B to Class I hazardous waste injection wells.

(b) *Definitions.*

Cone of influence means that area around the well within which increased injection zone pressures caused by injection into the hazardous waste injection well would be sufficient to drive fluids into an underground source of drinking water (USDW).

Existing well means a Class I well which was authorized prior to August 25, 1988 by an approved State program, or an EPA-administered program or a well which has become a Class I well as a result of a change in the definition of the injected waste which would render the waste hazardous under § 261.3 of this Part.

Injection interval means that part of the injection zone in which the well is screened, or in which the waste is otherwise directly emplaced.

New well means any Class I hazardous waste injection well which is not an existing well.

Transmissive fault or fracture is a fault or fracture that has sufficient permeability and vertical extent to allow fluids to move between formations.

§ 146.62 Minimum criteria for siting.

(a) All Class I hazardous waste injection wells shall be sited such that they inject into a formation that is beneath the lowermost formation containing within one quarter mile of the well bore an underground source of drinking water.

(b) The siting of Class I hazardous waste injection wells shall be limited to areas that are geologically suitable. The Director shall determine geologic suitability based upon:

(1) An analysis of the structural and stratigraphic geology, the hydrogeology, and the seismicity of the region;

(2) An analysis of the local geology and hydrogeology of the well site, including, at a minimum, detailed information regarding stratigraphy, structure and rock properties, aquifer hydrodynamics and mineral resources; and

(3) A determination that the geology of the area can be described confidently and that limits of waste fate and transport can be accurately predicted through the use of models.

(c) Class I hazardous waste injection wells shall be sited such that:

(1) The injection zone has sufficient permeability, porosity, thickness and areal extent to prevent migration of fluids into USDWs.

(2) The confining zone:

(i) Is laterally continuous and free of transecting, transmissive faults or fractures over an area sufficient to prevent the movement of fluids into a USDW; and

(ii) Contains at least one formation of sufficient thickness and with lithologic and stress characteristics capable of preventing vertical propagation of fractures.

(d) The owner or operator shall demonstrate to the satisfaction of the Director that:

(1) The confining zone is separated from the base of the lowermost USDW by at least one sequence of permeable and less permeable strata that will provide an added layer of protection for the USDW in the event of fluid movement in an unlocated borehole or transmissive fault; or

(2) Within the area of review, the piezometric surface of the fluid in the injection zone is less than the piezometric surface of the lowermost USDW, considering density effects, injection pressures and any significa pumping in the overlying USDW; or

(3) There is no USDW present.

(4) The Director may approve a si which does not meet the requiremen in paragraphs (d) (1), (2), or (3) of th section if the owner or operator ca demonstrate to the Director that b cause of the geology, nature of th waste, or other considerations, aba doned boreholes or other condui would not cause endangerment USDWs.

§ 146.63 Area of review.

For the purposes of Class I hazar ous waste wells, this section sha apply to the exclusion of § 146.6. Th area of review for Class I hazardou waste injection wells shall be a 2-mi radius around the well bore. The D rector may specify a larger area review based on the calculated cone influence of the well.

§ 146.64 Corrective action for wells in t area of review.

For the purposes of Class I hazar ous waste wells, this section sha apply to the exclusion of § 144.55 a § 146.07.

(a) The owner or operator of a Cla I hazardous waste well shall as part the permit application submit a pla to the Director outlining the protoc used to:

(1) Identify all wells penetrating th confining zone or injection zo within the area of review; and

(2) Determine whether wells are ad quately completed or plugged.

(b) The owner or operator of a Cla I hazardous waste well shall identi the location of all wells within th area of review that penetrate the i jection zone or the confining zone an shall submit as required in § 146.70(a

(1) A tabulation of all wells withi the area of review that penetrate th injection zone or the confining zon and

(2) A description of each well or typ of well and any records of its pluggin or completion.

(c) For wells that the Director dete mines are improperly plugged, com pleted, or abandoned, or for whic plugging or completion information unavailable, the applicant shall also submit a plan consisting of such steps or modification as are necessary to prevent movement of fluids into or between USDWs. Where the plan is adequate, the Director shall incorporate it into the permit as a condition. Where the Director's review of an application indicates that the permittee's plan is inadequate (based at a minimum on the factors in paragraph (e) of this section), the Director shall:

(1) Require the applicant to revise the plan;

(2) Prescribe a plan for corrective action as a condition of the permit; or

(3) Deny the application.

(d) Requirements:

(1) Existing injection wells. Any permit issued for an existing Class I hazardous waste injection well requiring corrective action other than pressure limitations shall include a compliance schedule requiring any corrective action accepted or prescribed under paragraph (c) of this section. Any such compliance schedule shall provide for compliance no later than 2 years following issuance of the permit and shall require observance of appropriate pressure limitations under paragraph (d)(3) until all other corrective action measures have been implemented.

(2) New injection wells. No owner or operator of a new Class I hazardous waste injection well may begin injection until all corrective actions required under this section have been taken.

(3) The Director may require pressure limitations in lieu of plugging. If pressure limitations are used in lieu of plugging, the Director shall require as a permit condition that injection pressure be so limited that pressure in the injection zone at the site of any improperly completed or abandoned well within the area of review would not be sufficient to drive fluids into or between USDWs. This pressure limitation shall satisfy the corrective action requirement. Alternatively, such injection pressure limitation may be made part of a compliance schedule and may be required to be maintained until all other required corrective actions have been implemented.

(e) In determining the adequacy of corrective action proposed by the applicant under paragraph (c) of this section and in determining the additional steps needed to prevent fluid movement into and between USDWs, the following criteria and factors shall be considered by the Director:

(1) Nature and volume of injected fluid;

(2) Nature of native fluids or byproducts of injection;

(3) Geology;

(4) Hydrology;

(5) History of the injection operation;

(6) Completion and plugging records;

(7) Closure procedures in effect at the time the well was closed;

(8) Hydraulic connections with USDWs;

(9) Reliability of the procedures used to identify abandoned wells; and

(10) Any other factors which might affect the movement of fluids into or between USDWs.

§ 146.65 Construction requirements.

(a) *General.* All existing and new Class I hazardous waste injection wells shall be constructed and completed to:

(1) Prevent the movement of fluids into or between USDWs or into any unauthorized zones;

(2) Permit the use of appropriate testing devices and workover tools; and

(3) Permit continuous monitoring of injection tubing and long string casing as required pursuant to §146.67(f).

(b) *Compatibility.* All well materials must be compatible with fluids with which the materials may be expected to come into contact. A well shall be deemed to have compatibility as long as the materials used in the construction of the well meet or exceed standards developed for such materials by the American Petroleum Institute, The American Society for Testing Materials, or comparable standards acceptable to the Director.

(c) *Casing and Cementing of New Wells.* (1) Casing and cement used in the construction of each newly drilled well shall be designed for the life expectancy of the well, including the post-closure care period. The casing and cementing program shall be designed to prevent the movement of fluids into or between USDWs, and to prevent potential leaks of fluids from the well. In determining and specifying casing and cementing requirements, the Director shall consider the following information as required by § 146.70:

(i) Depth to the injection zone;

(ii) Injection pressure, external pressure, internal pressure and axial loading;

(iii) Hole size;

(iv) Size and grade of all casing strings (well thickness, diameter, nominal weight, length, joint specification and construction material);

(v) Corrosiveness of injected fluid, formation fluids and temperature;

(vi) Lithology of injection and confining zones;

(vii) Type or grade of cement; and

(viii) Quantity and chemical composition of the injected fluid.

(2) One surface casing string shall, at a minimum, extend into the confining bed below the lowest formation that contains a USDW and be cemented by circulating cement from the base of the casing to the surface, using a minimum of 120% of the calculated annual volume. The Director may require more than 120% when the geology or other circumstances warrant it.

(3) At least one long string casing, using a sufficient number of centralizers, shall extend to the injection zone and shall be cemented by circulating cement to the surface in one or more stages:

(i) Of sufficient quantity and quality to withstand the maximum operating pressure; and

(ii) In a quantity no less than 120% of the calculated volume necessary to fill the annular space. The Director may require more than 120% when the geology or other circumstances warrant it.

(4) Circulation of cement may be accomplished by staging. The Director may approve an alternative method of cementing in cases where the cement cannot be recirculated to the surface, provided the owner or operator can demonstrate by using logs that the cement is continuous and does not allow fluid movement behind the well bore.

(5) Casings, including any casing connections, must be rated to have sufficient structural strength to withstand, for the design life of the well:

(i) The maximum burst and collapse pressures which may be experienced during the construction, operation and closure of the well; and

(ii) The maximum tensile stress which may be experienced at any point along the length of the casing during the construction, operation, and closure of the well.

(6) At a minimum, cement and cement additivies must be of sufficient quality and quantity to maintain integrity over the design life of the well.

(d) *Tubing and packer.* (1) All Class I hazardous waste injection wells shall inject fluids through tubing with a packer set at a point specified by the Director.

(2) In determining and specifying requirements for tubing and packer, the following factors shall be considered:

(i) Depth of setting;

(ii) Characteristics of injection fluid (chemical content, corrosiveness, temperature and density);

(iii) Injection pressure;

(iv) Annular pressure;

(v) Rate (intermittent or continuous), temperature and volume of injected fluid;

(vi) Size of casing; and

(vii) Tubing tensile, burst, and collapse strengths.

(3) The Director may approve the use of a fluid seal if he determines that the following conditions are met:

(i) The operator demonstrates that the seal will provide a level of protection comparable to a packer;

(ii) The operator demonstrates that the staff is, and will remain, adequately trained to operate and maintain the well and to identify and interpret variations in parameters of concern;

(iii) The permit contains specific limitations on variations in annular pressure and loss of annular fluid;

(iv) The design and construction of the well allows continuous monitoring of the annular pressure and mass balance of annular fluid; and

(v) A secondary system is used t monitor the interface between the annulus fluid and the injection fluid an the permit contains requirements fo testing the system every three months and recording the results.

§ 146.66 Logging, sampling, and testing prior to new well operation.

(a) During the drilling and construction of a new Class I hazardous waste injection well, appropriate logs and tests shall be run to determine or verify the depth, thickness, porosity, permeability, and rock type of, and the salinity of any entrained fluids in, all relevant geologic units to assure conformance with performance standards in § 146.65, and to establish accurate baseline data against which future measurements may be compared. A descriptive report interpreting results of such logs and tests shall be prepared by a knowledgeable log analyst and submitted to the Director. At a minimum, such logs and tests shall include:

(1) Deviation checks during drilling on all holes constructed by drilling a pilot hole which are enlarged by reaming or another method. Such checks shall be at sufficiently frequent intervals to determine the location of the borehole and to assure that vertical avenues for fluid movement in the form of diverging holes are not created during drilling; and

(2) Such other logs and tests as may be needed after taking into account the availability of similar data in the area of the drilling site, the construction plan, and the need for additional information that may arise from time to time as the construction of the well progresses. At a minimum, the following logs shall be required in the following situations:

(i) Upon installation of the surface casing:

(A) Resistivity, spontaneous potential, and caliper logs before the casing is installed; and

(B) A cement bond and variable density log, and a temperature log after the casing is set and cemented.

(ii) Upon installation of the long string casing:

(A) Resistivity, spontaneous potential, porosity, caliper, gamma ray, and fracture finder logs before the casing is installed; and

(B) A cement bond and variable density log, and a temperature log after the casing is set and cemented.

(iii) The Director may allow the use of an alternative to the above logs when an alternative will provide equivalent or better information; and

(3) A mechanical integrity test consisting of:

(i) A pressure test with liquid or gas;

(ii) A radioactive tracer survey;

(iii) A temperature or noise log;

(iv) A casing inspection log, if required by the Director; and

(v) Any other test required by the Director.

(b) Whole cores or sidewall cores of the confining and injection zones and formation fluid samples from the injection zone shall be taken. The Director may accept cores from nearby wells if the owner or operator can demonstrate that core retrieval is not possible and that such cores are representative of conditions at the well. The Director may require the owner or operator to core other formations in the borehole.

(c) The fluid temperature, pH, conductivity, pressure and the static fluid level of the injection zone must be recorded.

(d) At a minimum, the following information concerning the injection and confining zones shall be determined or calculated for Class I hazardous waste injection wells:

(1) Fracture pressure;

(2) Other physical and chemical characteristics of the injection and confining zones; and

(3) Physical and chemical characteristics of the formation fluids in the injection zone.

(e) Upon completion, but prior to operation, the owner or operator shall conduct the following tests to verify hydrogeologic characteristics of the injection zone:

(1) A pump test; or

(2) Injectivity tests.

(f) The Director shall have the opportunity to witness all logging and testing by this Subpart. The owner or operator shall submit a schedule of such activities to the Director 30 days prior to conducting the first test.

§ 146.67 Operating requirements.

(a) Except during stimulation, the owner or operator shall assure that injection pressure at the wellhead does not exceed a maximum which shall be calculated so as to assure that the pressure in the injection zone during injection does not initiate new fractures or propagate existing fractures in the injection zone. The owner or operator shall assure that the injection pressure does not initiate fractures or propagate existing fractures in the confining zone, nor cause the movement of injection or formation fluids into a USDW.

(b) Injection between the outermost casing protecting USDWs and the well bore is prohibited.

(c) The owner or operator shall maintain an annulus pressure that exceeds the operating injection pressure, unless the Director determines that such a requirement might harm the integrity of the well. The fluid in the annulus shall be noncorrosive, or shall contain a corrosion inhibitor.

(d) The owner or operator shall maintain mechanical integrity of the injection well at all times.

(e) Permit requirements for owners or operators of hazardous waste wells which inject wastes which have the potential to react with the injection formation to generate gases shall include:

(1) Conditions limiting the temperature, pH or acidity of the injected waste; and

(2) Procedures necessary to assure that pressure imbalances which might cause a backflow or blowout do not occur.

(f) The owner or operator shall install and use continuous recording devices to monitor: the injection pressure; the flow rate, volume, and temperature of injected fluids; and the pressure on the annulus between the tubing and the long string casing, and shall install and use:

(1) Automatic alarm and automatic shut-off systems, designed to sound and shut-in the well when pressures and flow rates or other parameters approved by the Director exceed a range and/or gradient specified in the permit; or

(2) Automatic alarms, designed to sound when the pressures and flow rates or other parameters approved by the Director exceed a rate and/or gradient specified in the permit, in cases where the owner or operator certifies that a trained operator will be on-site at all times when the well is operating.

(g) If an automatic alarm or shutdown is triggered, the owner or operator shall immediately investigate and identify as expeditiously as possible the cause of the alarm or shutoff. If, upon such investigation, the well appears to be lacking mechanical integrity, or if monitoring required under paragraph (f) of this section otherwise indicates that the well may be lacking mechanical integrity, the owner or operator shall:

(1) Cease injection of waste fluids unless authorized by the Director to continue or resume injection.

(2) Take all necessary steps to determine the presence or absence of a leak; and

(3) Notify the Director within 24 hours after the alarm or shutdown.

(h) If a loss of mechanical integrity is discovered pursuant to paragraph (g) of this section or during periodic mechanical integrity testing, the owner or operator shall:

(1) Immediately cease injection of waste fluids;

(2) Take all steps reasonably necessary to determine whether there may have been a release of hazardous wastes or hazardous waste constituents into any unauthorized zone;

(3) Notify the Director within 2 hours after loss of mechanical integr ty is discovered;

(4) Notify the Director when inje tion can be expected to resume; and

(5) Restore and demonstrate m chanical integrity to the satisfactio of the Director prior to resuming i jection of waste fluids.

(i) Whenever the owner or operat obtains evidence that there may ha been a release of injected wastes in an unauthorized zone:

(1) The owner or operator shall i mediately case injection of wa fluids, and:

(i) Notify the Director within hours of obtaining such evidence;

(ii) Take all necessary steps to identify and characterize the extent of any release;

(iii) Comply with any remediation plan specified by the Director;

(iv) Implement any remediation plan approved by the Director; and

(v) Where such release is into a USDW currently serving as a water supply, place a notice in a newspaper of general circulation.

(2) The Director may allow the operator to resume injection prior to completing cleanup action if the owner or operator demonstrates that the injection operation will not endanger USDWs.

(j) The owner or operator shall notify the Director and obtain his approval prior to conducting any well workover.

§ 146.68 Testing and monitoring requirements.

Testing and monitoring requirements shall at a minimum include:

(a) Monitoring of the injected wastes. (1) The owner or operator shall develop and follow an approved written waste analysis plan that describes the procedures to be carried out to obtain a detailed chemical and physical analysis of a representative sample of the waste, including the quality assurance procedures used. At a minimum, the plan shall specify:

(i) The paramenters for which the waste will be analyzed and the rationale for the selection of these parameters;

(ii) The test methods that will be used to test for these parameters; and

(iii) The sampling method that will be used to obtain a representative sample of the waste to be analyzed.

(2) The owner or operator shall repeat the analysis of the injected wastes as described in the waste analysis plan at frequencies specified in the waste analysis plan and when process or operating changes occur that may significantly alter the characteristics of the waste stream.

(3) The owner or operator shall conduct continuous or periodic monitoring of selected parameters as required by the Director.

(4) The owner or operator shall assure that the plan remains accurate and the analyses remain representative.

(b) Hydrogeologic compatibility determination. The owner or operator shall submit information demonstrating to the satisfaction of the Director that the waste stream and its anticipated reaction products will not alter the permeability, thickness or other relevant characteristics of the confining or injection zones such that they would no longer meet the requirements specified in § 146.62.

(c) Compatibility of well materials. (1) The owner or operator shall demonstrate that the waste stream will be compatible with the well materials with which the waste is expected to come into contact, and submit to the Director a description of the methodology used to make that determination. Compatibility for purposes of this requirement is established if contact with injected fluids will not cause the well materials to fail to satisfy any design requirement imposed under § 146.65(b).

(2) The Director shall require continuous corrosion monitoring of the construction materials used in the well for wells injecting corrosive waste, and may require such monitoring for other waste, by:

(i) Placing coupons of the well construction materials in contact with the waste stream; or

(ii) Routing the waste stream through a loop constructed with the material used in the well; or

(iii) Using an alternative method approved by the Director.

(3) If a corrosion monitoring program is required:

(i) The test shall use materials identical to those used in the construction of the well, and such materials must be continuously exposed to the operating pressures and temperatures (measured at the well head) and flow rates of the injection operation; and

(ii) The owner or operator shall monitor the materials for loss of mass, thickness, cracking, pitting and other signs of corrosion on a quarterly basis to ensure that the well components meet the minimum standards for material strength and performance set forth in § 146.65(b).

(d) *Periodic mechanical integrity testing.* In fulfilling the requirements of § 146.8, the owner or operator of a Class I hazardous waste injection well shall conduct the mechanical integrity testing as follows:

(1) The long string casing, injection tube, and annular seal shall be tested by means of an approved pressure test with a liquid or gas annually and whenever there has been a well workover;

(2) The bottom-hole cement shall be tested by means of an approved radioactive tracer survey annually;

(3) An approved temperature, noise, or other approved log shall be run at least once every five years to test for movement of fluid along the borehole. The Director may require such tests whenever the well is worked over;

(4) Casing inspection logs shall be run at least once every five years unless the Director waives this requirement due to well construction or other factors which limit the test's reliability; and

(5) Any other test approved by the Director in accordance with the procedures in § 146.8(d) may also be used.

(e) *Ambient monitoring.* (1) Based on a site-specific assessment of the potential for fluid movement from the well or injection zone, and on the potential value of monitoring wells to detect such movement, the Director shall require the owner or operator to develop a monitoring program. At a minimum, the Director shall require monitoring of the pressure buildup in the injection zone annually, including at a minimum, a shut down of the well for a time sufficient to conduct a valid observation of the pressure fall-off curve.

(2) When prescribing a monitoring system the Director may also require:

(i) Continuous monitoring for pressure changes in the first aquifer overlying the confining zone. When such a well is installed, the owner or operator shall, on a quarterly basis, sample the aquifer and analyze for constituents specified by the Director;

(ii) The use of indirect, geophysical techniques to determine the position of the waste front, the water quality in a formation designated by the Director, or to provide other site specific data;

(iii) Periodic monitoring of the ground water quality in the first aquifer overlying the injection zone;

(iv) Periodic monitoring of the ground water quality in the lowermost USDW; and

(v) Any additional monitoring necessary to determine whether fluids are moving into or between USDWs.

(f) The Director may require seismicity monitoring when he has reason to believe that the injection activity may have the capacity to cause seismic distrubances.

§ 146.69 Reporting requirements.

Reporting requirements shall, at a minimum, include:

(a) Quarterly reports to the Director containing:

(1) The maximum injection pressure;

(2) A description of any event that exceeds operating parameters for annulus pressure or injection pressure as specified in the permit;

(3) A description of any event which triggers an alarm or shutdown device required pursuant to § 146.67(f) and the response taken;

(4) The total volume of fluid injected;

(5) Any change in the annular fluid volume;

(6) The physical, chemical and other relevant characteristics of injected fluids; and

(7) The results of monitoring prescribed under § 146.68.

(b) Reporting, within 30 days or with the next quarterly report whicheve comes later, the results of:

(1) Periodic tests of mechanical integrity;

(2) Any other test of the injectio well conducted by the permittee if r quired by the Director; and

(3) Any well workover.

§ 146.70 Information to be evaluated the Director.

This section sets forth the inform tion which must be evaluated by th Director in authorizing Class I hazar ous waste injection wells. For a n Class I hazardous waste injection we the owner or operator shall submit the information listed below as part of the permit application. For an existing or converted Class I hazardous waste injection well, the owner or operator shall submit all information listed below as part of the permit application except for those items of information which are current, accurate, and available in the existing permit file. For both existing and new Class I hazardous waste injection wells, certain maps, cross-sections, tabulations of wells within the area of review and other data may be included in the application by reference provided they are current and readily available to the Director (for example, in the permitting agency's files) and sufficiently identifiable to be retrieved. In cases where EPA issues the permit, all the information in this section must be submitted to the Administrator or his designee.

(a) Prior to the issuance of a permit for an existing Class I hazardous waste injection well to operate or the construction or conversion of a new Class I hazardous waste injection well, the Director shall review the following to assure that the requirements of this Part and Part 144 are met:

(1) Information required in § 144.31;

(2) A map showing the injection well for which a permit is sought and the applicable area of review. Within the area of review, the map must show the number or name and location of all producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, mines (surface and subsurface), quarries, water wells and other pertinent surface features, including residences and roads. The map should also show faults, if known or suspected;

(3) A tabulation of all wells within the area of review which penetrate the proposed injection zone or confining zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of plugging and/or completion and any additional information the Director may require;

(4) The protocol followed to identify, locate and ascertain the condition of abandoned wells within the area of review which penetrate the injection or the confining zones;

(5) Maps and cross-sections indicating the general vertical and lateral limits of all underground sources of drinking water within the area of review, their position relative to the injection formation and the direction of water movement, where known, in each underground source of drinking water which may be affected by the proposed injection;

(6) Maps and cross-sections detailing the geologic structure of the local area;

(7) Maps and cross-sections illustrating the regional geologic setting;

(8) Proposed operating data;

(i) Average and maximum daily rate and volume of the fluid to be injected; and

(ii) Average and maximum injection pressure;

(9) Proposed formation testing program to obtain an analysis of the chemical, physical and radiological characteristics of and other information on the injection formation and the confining zone;

(10) Proposed stimulation program;

(11) Proposed injection procedure;

(12) Schematic or other appropriate drawings of the surface and subsurface construction details of the well;

(13) Contingency plans to cope with all shut-ins or well failures so as to prevent migration of fluids into any USDW;

(14) Plans (including maps) for meeting monitoring requirements of § 146.68;

(15) For wells within the area of review which penetrate the injection zone or the confining zone but are not properly completed or plugged, the corrective action to be taken under § 146.64;

(16) Construction procedures including a cementing and casing program, well materials specifications and their life expectancy, logging procedures, deviation checks, and a drilling, testing and coring program; and

(17) A demonstration pursuant to Part 144, Subpart F, that the applicant has the resources necessary to close, plug or abandon the well and for post-closure care.

(b) Prior to the Director's granting approval for the operation of a Class I hazardous waste injection well, the owner or operator shall submit and the Director shall review the following information, which shall be included in the completion report:

(1) All available logging and testing program data on the well;

(2) A demonstration of mechanical integrity pursuant to § 146.68;

(3) The anticipated maximum pressure and flow rate at which the permittee will operate;

(4) The results of the injection zone and confining zone testing program as required in § 146.70(a)(9);

(5) The actual injection procedure;

(6) The compatibility of injected waste with fluids in the injection zone and minerals in both the injection zone and the confining zone and with the materials used to construct the well;

(7) The calculated area of review based on data obtained during logging and testing of the well and the formation, and where necessary revisions to the information submitted under § 146.70(a) (2) and (3).

(8) The status of corrective action on wells identified in § 146.70(a)(15).

(c) Prior to granting approval for the plugging and abandonment (i.e., closure) of a Class I hazardous waste injection well, the Director shall review the information required in §§ 146.71(a)(4) and 146.72(a).

(d) Any permit issued for a Class I hazardous waste injection well for disposal on the premises where the waste is generated shall contain a certification by the owner or operator that:

(1) The generator of the hazardous waste has a program to reduce the volume or quantity and toxicity of such waste to the degree determined by the generator to be economically practicable; and

(2) Injection of the waste is that practicable method of disposal currently available to the generator which minimizes the present and future threat to human health and the environment.

§ 146.71 Closure.

(a) *Closure Plan.* The owner or operator of a Class I hazardous waste injection well shall prepare, maintain, and comply with a plan for closure of the well that meets the requirements of paragraph (d) of this section and is acceptable to the Director. The obligation to implement the closure plan survives the termination of a permit or the cessation of injection activities. The requirement to maintain and implement an approved plan is directly enforceable regardless of whether the requirement is a condition of the permit.

(1) The owner or operator shall submit the plan as a part of the permit application and, upon approval by the Director, such plan shall be a condition of any permit issued.

(2) The owner or operator shall submit any proposed significant revision to the method of closure reflected in the plan for approval by the Director no later than the date on which notice of closure is required to be submitted to the Director under paragraph (b) of this section.

(3) The plan shall assure financial responsibility as required in § 144.52(a)(7).

(4) The plan shall include the following information:

(i) The type and number of plugs to be used;

(ii) The placement of each plug including the elevation of the top and bottom of each plug;

(iii) The type and grade and quantity of material to be used in plugging;

(iv) The method of placement of the plugs;

(v) Any proposed test or measure to be made;

(vi) The amount, size, and location (by depth) of casing and any other materials to be left in the well;

(vii) The method and location where casing is to be parted, if applicable;

(viii) The procedure to be used to meet the requirements of paragraph (d)(5) of this section;

(ix) The estimated cost of closure; and

(x) Any proposed test or measure to be made.

(5) The Director may modify a closure plan following the procedures of § 124.5.

(6) An owner or operator of a Class I hazardous waste injection well who ceases injection temporarily, may keep the well open provided he:

(i) Has received authorization from the Director; and

(ii) Has described actions or procedures, satisfactory to the Director, that the owner or operator will take to ensure that the well will not endanger USDWs during the period of temporary disuse. These actions and procedures shall include compliance with the technical requirements applicable to active injection wells unless waived by the Director.

(7) The owner or operator of a well that has ceased operations for more than two years shall notify the Director 30 days prior to resuming operation of the well.

(b) *Notice of intent to close.* The owner or operator shall notify the Director at least 60 days before closure of a well. At the discretion of the Director, a shorter notice period may be allowed.

(c) *Closure report.* Within 60 days after closure or at the time of the next quarterly report (whichever is less) the owner or operator shall submit a closure report to the Director. If the quarterly report is due less than 15 days after completion of closure, then the report shall be submitted within 60 days after closure. The report shall be certified as accurate by the owner or operator and by the person who performed the closure operation (if other than the owner or operator). Such report shall consist of either: (1) A statement that the well was closed in accordance with the closure plan previously submitted and approved by the Director; or

(2) Where actual closure differed from the plan previously submitted, a written statement specifying the differences between the previous plan and the actual closure.

(d) *Standards for well closure.* (1) Prior to closing the well, the owner or operator shall observe and record the pressure decay for a time specified by the Director. The Director shall analyze the pressure decay and the transient pressure observations conducted pursuant to § 146.68(e)(1)(i) and determine whether the injection activity has conformed with predicted values.

(2) Prior to well closure, appropriate mechanical integrity testing shall be conducted to ensure the integrity of that portion of the long string casing and cement that will be left in the ground after closure. Testing methods may include:

(i) Pressure tests with liquid or gas;

(ii) Radioactive tracer surveys;

(iii) Noise, temperature, pipe evaluation, or cement bond logs; and

(iv) Any other test required by the Director.

(3) Prior to well closure, the well shall be flushed with a buffer fluid.

(4) Upon closure, a Class I hazardous waste well shall be plugged with cement in a manner that will not allow the movement of fluids into or between USDWs.

(5) Placement of the cement plugs shall be accomplished by one of the following:

(i) The Balance Method;

(ii) The Dump Bailer Method;

(iii) The Two-Plug Method; or

(iv) An alternate method, approved by the Director, that will reliably provide a comparable level of protection.

(6) Each plug used shall be appropriately tagged and tested for seal and stability before closure is completed.

(7) The well to be closed shall be in a state of static equilibrium with the mud weight equalized top to bottom, either by circulating the mud in the well at least once or by a comparable method prescribed by the Director, prior to the placement of the cement plug(s).

§ 146.72 Post-closure care.

(a) The owner or operator of a Class I hazardous waste well shall prepare, maintain, and comply with a plan for post-closure care that meets the requirements of paragraph (b) of this section and is acceptable to the Director. The obligation to implement the post-closure plan survives the termination of a permit or the cessation of injection activities. The requirement to maintain an approved plan is directly enforceable regardless of whether the requirement is a condition of the permit.

(1) The owner or operator shall submit the plan as a part of the permit application and, upon approval by the Director, such plan shall be a condition of any permit issued.

(2) The owner or operator shall submit any proposed significant revision to the plan as appropriate over the life of the well, but no later than the date of the closure report required under § 146.71(c).

(3) The plan shall assure financial responsibility as required in § 146.73.

(4) The plan shall include the following information:

(i) The pressure in the injection zone before injection began;

(ii) The anticipated pressure in the injection zone at the time of closure;

(iii) The predicted time until pressure in the injection zone decays to the point that the well's cone of influence no longer intersects the base of the lowermost USDW;

(iv) Predicted position of the waste front at closure;

(v) The status of any cleanups required under § 146.64; and

(vi) The estimated cost of proposed post-closure care.

(5) At the request of the owner or operator, or on his own initiative, the Director may modify the post-closure plan after submission of the closure report following the procedures in § 124.5.

(b) The owner or operator shall:

(1) Continue and complete any cleanup action required under § 146.64, if applicable;

(2) Continue to conduct any groundwater monitoring required under the permit until pressure in the injection zone decays to the point that the well's cone of influence no longer intersects the base of the lowermost USDW. The Director may extend the period of post-closure monitoring if he determines that the well may endanger a USDW.

(3) Submit a survey plat to the local zoning authority designated by the Director. The plat shall indicate the location of the well relative to permanently surveyed benchmarks. A copy of the plat shall be submitted to the Regional Administrator of the appropriate EPA Regional Office.

(4) Provide appropriate notification and information to such State and local authorities as have cognizance over drilling activities to enable such State and local authorities to impose appropriate conditions on subsequent drilling activities that may penetrate the well's confining or injection zone.

(5) Retain, for a period of three years following well closure, records reflecting the nature, composition and volume of all injected fluids. The Director shall require the owner or operator to deliver the records to the Director at the conclusion of the retention period, and the records shall thereafter be retained at a location designated by the Director for that purpose.

(c) Each owner of a Class I hazardous waste injection well, and the owner of the surface or subsurface property on or in which a Class I hazardous waste injection well is located, must record a notation on the deed to the facility property or on some other instrument which is normally examined during title search that will in perpetuity provide any potential purchaser of the property the following information:

(1) The fact that land has been used to manage hazardous waste;

(2) The name of the State agency or local authority with which the plat was filed, as well as the address of the Regional Environmental Protection Agency Office to which it was submitted;

(3) The type and volume of waste injected, the injection interval or intervals into which it was injected, and the period over which injection occurred.

§ 146.73 Financial responsibility for post-closure care.

The owner or operator shall demonstrate and maintain financial responsibility for post-closure by using a trust fund, surety bond, letter of credit, financial test, insurance or corporate guarantee that meets the specifications for the mechanisms and instruments revised as appropriate to cover closure and post-closure care in 40 CFR Part 144, Subpart F. The amount of the funds available shall be no less than the amount identified in § 146.72(a)(4)(vi). The obligation to maintain financial responsibility for post-closure care survives the termination of a permit or the cessation of injection. The requirement to maintain financial responsibility is enforceable regardless of whether the requirement is a condition of the permit.

PART 147—STATE UNDERGROUND INJECTION CONTROL PROGRAMS

Subpart A—General Provisions

Sec.
147.1 Purpose and scope.
147.2 Severability of provisions.

Subpart B—Alabama

147.50 State-administered program—Class II wells.
147.51 State-administered program—Class I, III, IV, and V wells.
147.60 EPA-administered program—Indian lands.

Subpart C—Alaska

147.100 State-administered program—Class II wells.
147.101 EPA-administered program.
147.102 Aquifer exemptions.
147.103 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells authorized by rule.
147.104 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.

Subpart D—Arizona

147.150 State-administered program. [Reserved]
147.151 EPA-administered program.
147.152 Aquifer exemptions. [Reserved]

Subpart E—Arkansas

147.200 State-administered program—Class I, III, IV, and V wells.
147.201 State-administered program—Class II wells. [Reserved]
147.205 EPA-administered program—Indian lands.

Subpart F—California

147.250 State-administered program—Class II wells.
147.251 EPA-administered program—Class I, III, IV, and V wells and Indian lands.
147.252 Aquifer exemptions. [Reserved]
147.253 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells authorized by rule.

Subpart G—Colorado

147.300 State-administered program. [Reserved]
Sec.
147.301 EPA-administered program—Class I, III, IV, V wells and Indian lands.
147.302 Aquifer exemptions.
147.303 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells authorized by rule.
147.304 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.
147.305 Requirements for all wells.

Subpart H—Connecticut

147.350—147.359 [Reserved]
147.353 EPA-administered program—Indian lands.

Subpart I—Delaware

147.400—147.402 [Reserved]
147.403 EPA-administered program—Indian lands.
147.404—147.449 [Reserved]

Subpart J—District of Columbia

147.450 State-administered program. [Reserved]
147.451 EPA-administered program.
147.452 Aquifer exemptions. [Reserved]

Subpart K—Florida

147.500 State-administered program—Class I, III, IV, and V wells.
147.501 EPA-administered program—Class II wells and Indian lands.
147.502 Aquifer exemptions. [Reserved]
147.503 Existing Class II (except enhanced recovery and hydrocarbon storage) wells authorized by rule.
147.504 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.

Subpart L—Georgia

147.550—147.552 [Reserved]
147.553 EPA-administered program—Indian lands.
147.554—147.559 [Reserved]

Subpart M—Hawaii

147.600 State-administered program. [Reserved]
147.601 EPA-administered program.

Subpart N—Idaho

147.650 State-administrative program—Class I, II, III, IV, and V wells.
147.651 EPA-administered program.
147.652 Aquifer exemptions. [Reserved]

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Subpart O—Illinois

147.700 State-administered program—Class I, III, IV, and V wells.
147.701 State-administered program—Class II wells.
147.703 EPA-administered program—Indian lands.

Subpart P—Indiana

147.750 State-administered program. [Reserved]
147.751 EPA-administered program.
147.752 Aquifer exemptions. [Reserved]
147.753 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells authorized by rule.
147.754 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.
147.755 Requirements for all wells.

Subpart Q—Iowa

147.800 State-administered program. [Reserved]
147.801 EPA-administered program.
147.802 Aquifer exemptions. [Reserved]

Subpart R—Kansas

147.850 State-administered program—Class I, III, IV and V wells.
147.851 State-administered program—Class II wells.
147.852—147.859 [Reserved]
147.860 EPA-administered program—Indian lands.

Subpart S—Kentucky

147.900 State-administered program. [Reserved]
147.901 EPA-administered program.
147.902 Aquifer exemptions. [Reserved]
147.903 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells authorized by rule.
147.904 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.
147.905 Requirements for all wells—area of review.

Subpart T—Louisiana

147.950 State-administered program.
147.951 EPA-administered program—Indian lands.

Subpart U—Maine

147.1000 State-administered program.
147.1001 EPA-administered program—Indian lands.

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Subpart V—Maryland

147.1050—147.1099 [Reserved]
147.1053 EPA-administered program—Indian lands.

Subpart W—Massachusetts

147.1100 State-administered program.
147.1101 EPA-administered program—Indian lands.

Subpart X—Michigan

147.1150 State-administered program. [Reserved]
147.1151 EPA-administered program.
147.1152 Aquifer exemptions. [Reserved]
147.1153 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells authorized by rule.
147.1154 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.
147.1155 Requirements for all wells.

Subpart Y—Minnesota

147.1200 State-administered program. [Reserved]
147.1201 EPA-administered program.
147.1202 Aquifer exemptions. [Reserved]
147.1210 Requirements for Indian lands.

Subpart Z—Mississippi

147.1250 State-administered program—Class I, III, IV, and V wells.
147.1251 State-administered program—Class II wells.
147.1252 EPA-administered program—Indian lands.

Subpart AA—Missouri

147.1300 State-administered program.
147.1301 State-administered program—Class I, III, IV, and V wells.
147.1302 Aquifer exemptions. [Reserved]
147.1303 EPA-administered program—Indian lands.

Subpart BB—Montana

147.1350 State-administered program. [Reserved]
147.1351 EPA-administered program.
147.1352 Aquifer exemptions.
147.1353 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells authorized by rule.
147.1354 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.
147.1355 Requirements for all wells.

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Subpart CC—Nebraska

147.1400 State-administered program—Class II wells.
147.1401 State-administered program—Class I, III, IV, and V wells.
147.1402 Aquifer exemptions. [Reserved]
147.1403 EPA-administered program—Indian lands.

Subpart DD—Nevada

147.1450 State-administered program.
147.1451 EPA-administered program—Indian lands.
147.1452 [Reserved]
147.1453 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells authorized by rule.
147.1454 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.

Subpart EE—New Hampshire

147.1500 State-administered program.
147.1501 EPA-administered program—Indian lands.

Subpart FF—New Jersey

147.1550 State-administered program.
147.1551 EPA-administered program—Indian lands.

Subpart GG—New Mexico

147.1600 State-administered program—Class II wells.
147.1601 State-administered program—Class I, III, IV and V wells.
147.1603 EPA-administered program—Indian lands.

Subpart HH—New York

147.1650 State-administered program. [Reserved]
147.1651 EPA-administered program.
147.1652 Aquifer exemptions.
147.1653 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells authorized by rule.
147.1654 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.
147.1655 Requirements for wells authorized by permit.

Subpart II—North Carolina

147.1700—147.1702 [Reserved]
147.1703 EPA-administered program—Indian lands.
147.1704—147.1749 [Reserved]

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Subpart JJ—North Dakota

147.1750 State-administered program—Class II wells.
147.1751 State-administered program—Class I, III, IV and V wells.
147.1752 EPA-administered program—Indian lands.

Subpart KK—Ohio

147.1800 State-administered program—Class II wells.
147.1801 State-administered program—Class I, III, IV and V wells.
147.1802 Aquifer exemptions. [Reserved]
147.1803 Existing Class I and III wells authorized by rule—maximum injection pressure.
147.1805 EPA-administered program—Indian lands.

Subpart LL—Oklahoma

147.1850 State-administered program—Class I, III, IV and V wells.
147.1851 State-administered program—Class II wells.
147.1852 EPA-administered program—Indian lands.

Subpart MM—Oregon

147.1900 State-administered program.
147.1901 EPA-administered program—Indian lands.

Subpart NN—Pennsylvania

147.1950 State-administered program. [Reserved]
147.1951 EPA-administered program.
147.1952 Aquifer exemptions.
147.1953 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells authorized by rule.
147.1954 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.
147.1955 Requirements for wells authorized by permit.

Subpart OO—Rhode Island

147.2000 State-administered program—Class I, II, III, IV, and V wells.
147.2001 EPA-administered program—Indian lands.

Subpart PP—South Carolina

147.2050 State-administered program.
147.2051 EPA-administered program—Indian lands.

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Subpart QQ—South Dakota

147.2100 State-administered program—Class II wells.
147.2101 EPA-administered program.
147.2102 Aquifer exemptions.
147.2103 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.
147.2104 Requirements for all wells.

Subpart RR—Tennessee

147.2150 State-administered program. [Reserved]
147.2151 EPA-administered program.
147.2152 Aquifer exemptions. [Reserved]
147.2153 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells authorized by rule.
147.2154 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.
147.2155 Requirements for all wells—area of review.

Subpart SS—Texas

147.2200 State-administered program—Class I, III, IV, and V wells.
147.2201 State-administered program—Class II wells.
147.2205 EPA-administered program—Indian lands.

Subpart TT—Utah

147.2250 State-administered program—Class I, III, IV, and V wells.
147.2251 State-administered program—Class II wells.
147.2253 EPA-administered program—Indian lands.

Subpart UU—Vermont

147.2300 State-administered program.
147.2301—147.2349 [Reserved]
147.2303 EPA-administered program—Indian lands.

Subpart VV—Virginia

147.2350 State-administered program. [Reserved]
147.2351 EPA-administered program.
147.2352 Aquifer exemptions. [Reserved]

Subpart WW—Washington

147.2400 State-administered program—Class I, II, III, IV, and V wells.
147.2403 EPA-administered program—Indian lands.
147.2404 EPA-administered program—Colville Reservation.

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Subpart XX—West Virginia

147.2450—147.2452 [Reserved]
147.2453 EPA-administered program—Indian lands.
147.2454—147.2499 [Reserved]

Subpart YY—Wisconsin

147.2500 State-administered program.
147.2510 EPA-administered program—Indian lands.

Subpart ZZ—Wyoming

147.2550 State-administered program—Class I, III, IV, and V wells.
147.2551 State-administered program—Class II wells.
147.2553 EPA-administered program—Indian lands.
147.2554 Aquifer exemptions.

Subpart AAA—Guam

147.2600 State-administered program.
147.2601 EPA-administered program—Indian lands.

Subpart BBB—Puerto Rico

147.2650 State-administered program. [Reserved]
147.2651 EPA-administered program.

Subpart CCC—Virgin Islands

147.2700 State-administered program. [Reserved]
147.2701 EPA-administered program.

Subpart DDD—American Samoa

147.2750 State administered program. [Reserved]
147.2751 EPA-administered program.
147.2752 Aquifer exemptions. [Reserved]

Subpart EEE—Commonwealth of the Northern Mariana Islands

147.2800 State-administered program—Class I, II, III, IV, and V wells.
147.2801 EPA-administered program.
147.2802 Aquifer exemptions. [Reserved]

Subpart FFF—Trust Territory of the Pacific Islands

147.2850 State-administered program. [Reserved]
147.2851 EPA-administered program.
147.2852 Aquifer exemptions. [Reserved]

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Subpart GGG—Osage Mineral Reserve—Class II Wells

147.2901 Applicability and scope.
147.2902 Definitions.
147.2903 Prohibition of unauthorized injection.
147.2904 Area of review.
147.2905 Plugging and abandonment.
147.2906 Emergency permits.
147.2907 Confidentiality of information.
147.2908 Aquifer exemptions.
147.2909 Authorization of existing wells by rule.
147.2910 Duration of authorization by rule.
147.2911 Construction requirements for wells authorized by rule.
147.2912 Operating requirements for wells authorized by rule.
147.2913 Monitoring and reporting requirements for wells authorized by rule.
147.2914 Corrective action for wells authorized by rule.
147.2915 Requiring a permit for wells authorized by rule.
147.2916 Coverage of permitting requirements.
147.2917 Duration of permits.
147.2918 Permit application information.
147.2919 Construction requirements for wells authorized by permit.
147.2920 Operating requirements for wells authorized by permit.
147.2921 Schedule of compliance.
147.2922 Monitoring and reporting requirements for wells authorized by permit.
147.2923 Corrective action for wells authorized by permit.
147.2924 Area permits.
147.2925 Standard permit conditions.
147.2926 Permit transfers.
147.2927 Permit modification.
147.2928 Permit termination.
147.2929 Administrative permitting procedures.

Subpart HHH—Lands of the Navajo, Ute Mountain Ute, and All Other New Mexico Tribes

147.3000 EPA-administered program.
147.3001 Definition.
147.3002 Public notice of permit actions.
147.3003 Aquifer exemptions.
147.3004 Duration of rule authorization for existing Class I and III wells.
147.3005 Radioactive waste injection wells.
147.3006 Injection pressure for existing Class II wells authorized by rule.
147.3007 Application for a permit.
147.3008 Criteria for aquifer exemptions.
147.3009 Area of review.
147.3010 Mechanical integrity tests.
147.3011 Plugging and abandonment of Class III wells.

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147.3012 Construction requirements for Class I wells.
147.3013 Information to be considered for Class I wells.
147.3014 Construction requirements for Class III wells.
147.3015 Information to be considered for Class III wells.
147.3016 Criteria and standards applicable to Class V wells.
Appendix A to Subpart HHH—Exempted Aquifers in New Mexico.

Subpart III—Lands of Certain Oklahoma Indian Tribes

147.3100 EPA-administered program.
147.3101 Public notice of permit actions.
147.3102 Plugging and abandonment plans.
147.3103 Fluid seals.
147.3104 Notice of abandonment.
147.3105 Plugging and abandonment report.
147.3106 Area of review.
147.3107 Mechanical integrity.
147.3108 Plugging Class I, II, and III wells.
147.3109 Timing of mechanical integrity test.

AUTHORITY: 42 U.S.C. 300h; and 42 U.S.C. 6901 *et seq.*

SOURCE: 49 FR 20197, May 11, 1984, unless otherwise noted.

Subpart A—General Provisions

§ 147.1 Purpose and scope.

(a) This part sets forth the applicable Underground Injection Control (UIC) programs for each of the states, territories, and possessions identified pursuant to the Safe Drinking Water Act (SDWA) as needing a UIC program.

(b) The applicable UIC program for a State is either a State-administered program approved by EPA, or a federally-administered program promulgated by EPA. In some cases, the UIC program may consist of a State-administered program applicable to some classes of wells and a federally-administered program applicable to other classes of wells. Approval of a State program is based upon a determination by the Administrator that the program meets the requirements of section 1422 or section 1425 of the Safe Drinking Water Act and the applicable provisions of Parts 124, 144, and 146 of this chapter. A federally-administered program is promulgated in those instances where the state has failed to submit a program for approval or where the submitted program does not meet the minimum statutory and regulatory requirements.

(c) In the case of State programs approved by EPA pursuant to section 1422 of the SDWA, each State subpart describes the major elements of such programs, including State statutes and regulations, Statement of Legal Authority, Memorandum of Agreement, and Program Description. State statutes and regulations that contain standards, requirements, and procedures applicable to owners or operators have been incorporated by reference pursuant to regulations of the Office of the Federal Register. Material incorporated by reference is available for inspection in the appropriate EPA Regional Office, in EPA Headquarters, and at the Office of the Federal Register Information Center, Room 8301, 1100 L Street, NW, Washington, DC 20408. Other State statutes and regulations containing standards and procedures that constitute elements of the State program but do not apply directly to owners or operators have been listed but have not been incorporated by reference.

(d) In the case of State programs promulgated under section 1422 that are to be administered by EPA, the State subpart makes applicable the provisions of Parts 124, 144, and 146, and provides additional requirements pertinent to the specific State program.

(e) Regulatory provisions incorporated by reference (in the case of approved State programs) or promulgated by EPA (in the case of EPA-administered programs), and all permit conditions or permit denials issued pursuant to such regulations, are enforceable by the Administrator pursuant to section 1423 of the SDWA.

(f) The information requirements located in the following sections have been cleared by the Office of Management and Budget: Sections 147.104, 147.304, 147.754, 147.904, 147.1154, 147.1354, 147.1454, 147.1654, 147.1954, and 147.2154.

The OMB clearance number is No. 2040-0042.

§ 147.2 Severability of provisions.

The provisions in this part and the various applications thereof are distinct and severable. If any provision of this part or the application thereof to any person or circumstances is held invalid, such invalidity shall not affect other provisions or application of such provision to other persons or circumstances which can be given effect without the invalid provision or application.

Subpart B—Alabama

§ 147.50 State-administered program—Class II wells.

The UIC program for Class II wells in the State of Alabama, except those on Indian lands, is the program administered by the State Oil and Gas Board of Alabama, approved by EPA pursuant to section 1425 of the SDWA. Notice of this approval was published in the Federal Register on August 2, 1982 (47 FR 33268); the effective date of this program is August 2, 1982. This program consists of the following elements, as submitted to EPA in the State's program application:

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Alabama. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) Code of Alabama 1975, sections 9-17-1 through 9-17-110 (1980 and Supp. 1983);

(2) State Oil and Gas Board of Alabama, Oil and Gas Report 1 (supplemented) (1981), General Order Prescribing Rules and Regulations Governing the Conservation of Oil and Gas in Alabama (Order No. 76-100) as amended by Board Order No. 82-96 (May 14, 1982) amending Rule E-4).

(b) The Memorandum of Agreement between EPA Region IV and the Alabama Oil and Gas Board, signed by the EPA Regional Administrator on June 15, 1982.

(c) *Statement of legal authority.* "State Oil and Gas Board has Authority to Carry Out Underground Injection Control Program Relating to Class II Wells as Described in Federal Safe Drinking Water Act—Opinion by Assistant Attorney General," May 28, 1982.

(d) The Program Description and any other materials submitted as part of the application or as supplements thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43086, Oct. 25, 1988]

§ 147.51 State-administered program—Class I, III, IV, and V wells.

The UIC program for Class I, III, IV and V wells in the State of Alabama, except those on Indian lands, is the program administered by the Alabama Department of Environmental Management, approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on August 25, 1983 (48 FR 38640); the effective date of this program is August 25, 1983. This program consists of the following elements, as submitted to EPA in the State's program application:

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Alabama. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) Alabama Water Pollution Control Act, Code of Alabama 1975, sections 22-22-1 through 22-22-14 (1980 and Supp. 1983);

(2) Regulations, Policies and Procedures of the Alabama Water Improvement Commission, Title I (Regulations) (Rev. December 1980), as amended May 17, 1982, to add Chapter 9, Underground Injection Control Regulations (effective June 10, 1982), as amended April 6, 1983 (effective May 11, 1983).

(b) The Memorandum of Agreement between EPA Region IV and the Alabama Department of Environment Management, signed by the EPA Regional Administrator on May 24, 1983.

(c) *Statement of legal authority.* (1) "Water Pollution—Public Health—State has Authority to Carry Out Underground Injection Control Program Described in Federal Safe Drinking Water Act—Opinion by Legal Counsel for the Water Improvement Commission," June 25, 1982;

(2) Letter from Attorney, Alabama Water Improvement Commission, to Regional Administrator, EPA Region IV, "Re: AWIC Response to Phillip Tate's (U.S. EPA, Washington) Comments on AWIC's Final Application for Class I, III, IV, and V UIC Program," September 21, 1982;

(3) Letter from Alabama Chief Assistant Attorney General to Regional Counsel, EPA Region IV, "Re: Status of Independent Legal Counsel in Alabama Water Improvement Commission's Underground Injection Control Program," September 14, 1982.

(d) The Program Description and any other materials submitted as part of the application or as supplements thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43086, Oct. 25, 1988]

§ 147.60 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in Alabama is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program for Indian lands in Alabama is November 25, 1988.

[53 FR 43086, Oct. 25, 1988]

Subpart C—Alaska

§ 147.100 State-administered program—Class II wells.

The UIC program for Class II wells in the State of Alaska, other than those on Indian lands, is the program administered by the Alaska Oil and Gas Conservation Commission approved by EPA pursuant to Section 1425 of the SDWA. Notice of this approval was published in the FEDERAL

REGISTER [May 6, 1986]; the effective date of this program is June 19, 1986. This program consists of the following elements, as submitted to EPA in the State's program application.

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Alaska. This incorporation by reference was approved by the Director of the FEDERAL REGISTER effective June 19, 1986.

(1) Alaska Statutes, Alaska Oil and Gas Conservation Act, Title 31, §§ 31.05.005 through 31.30.010 (1979 and Cum. Supp. 1984);

(2) Alaska Statutes, Administrative Procedures Act, Title 44, §§ 44.62.010 through 44.62.650 (1984);

(3) Alaska Administrative Code, Alaska Oil and Gas Conservation Commission, 20 AAC 25.005 through 20 AAC 25.570 (Supp. 1986).

(b) The Memorandum of Agreement between EPA Region 10, and the Alaska Oil and Gas Conservation Commission, signed by the EPA Regional Administrator on January 29, 1986.

(c) *Statement of Legal Authority.* Statement from the Attorney General of the State of Alaska, signed by the Assistant Attorney General on December 10, 1985.

(d) The Program Description and any other materials submitted as part of the original application or as supplements thereto.

[51 FR 16684, May 6, 1986]

§ 147.101 EPA-administered program.

(a) *Contents.* The UIC program in the State of Alaska for Classes I, III, IV and V wells, and for all classes of wells on Indian lands, is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, and 146, and additional requirements set forth in the remainder of this subpart. Injection wells owners and operators and EPA shall comply with these requirements.

(b) *Effective dates.* The effective date of the UIC program for all non-Class II wells in Alaska and for all wells on Indian lands, is June 25, 1984.

[52 FR 17680, May 11, 1987]

§ 147.102 Aquifer exemptions.

(a) This section identifies any aquifers or their portions exempted in accordance with §§ 144.7(b) and 146.4 of this chapter at the time of program promulgation. EPA may in the future exempt other aquifers or portions, according to applicable procedures, without codifying such exemptions in this section. An updated list of exemptions will be maintained in the Regional office.

(b) The following aquifers are exempted in accordance with the provisions of §§ 144.7(b) and 146.4 of this chapter for Class II injection activities only:

(1) The portions of aquifers in the Kenai Peninsula, greater than the indicated depths below the ground surface, and described by a ¼ mile area beyond and lying directly below the following oil and gas producing fields:

(i) Swanson River Field—1700 feet.

(ii) Beaver Creek Field—1650 feet.

(iii) Kenai Gas Field—1300 feet.

(2) The portion of aquifers beneath Cook Inlet described by a ¼ mile area beyond and lying directly below the following oil and gas producing fields:

(i) Granite Point.

(ii) McArthur River Field.

(iii) Middle Ground Shoal Field.

(iv) Trading Bay Field.

(3) The portions of aquifers on the North Slope described by a ¼ mile area beyond and lying directly below the Kuparuk River Unit oil and gas producing field.

§ 147.103 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells authorized by rule.

Maximum injection pressure. The owner or operator shall limit injection pressure to the lesser of:

(a) A value which will not exceed the operating requirements of § 144.28(f)(3) (i) or (ii) as applicable; or

(b) A value for well head pressure calculated by using the following formula:

$Pm = (0.733 - 0.433\ Sg)d$

where

Pm = injection pressure at the well head in pounds per square inch

Sg=specific gravity of inject fluid (unitless)
d=injection depth in feet.

§ 147.104 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.

(a) *Maximum injection pressure.* (1) To meet the operating requirements of § 144.28(f)(3)(ii) (A) and (B) of this chapter, the owner or operator:

(i) Shall use an injection pressure no greater than the pressure established by the Regional Administrator for the field or formation in which the well is located. The Regional Administrator shall establish maximum injection pressures after notice, opportunity for comment, and opportunity for a public hearing, according to the provisions of Part 124, Subpart A of this chapter, and will inform owners and operators in writing of the applicable maximum pressure; or

(ii) May inject at pressures greater than those specified in paragraph (a)(1)(i) of this section for the field or formation in which he is operating provided he submits a request in writing to the Regional Administrator, and demonstrates to the satisfaction of the Regional Administrator that such injection pressure will not violate the requirement of § 144.28(f)(3)(ii) (A) and (B). The Regional Administrator may grant such a request after notice, opportunity for comment, and opportunity for a public hearing, according to the provisions of Part 124, Subpart A of this chapter.

(2) Prior to such time as the Regional Administrator establishes rules for maximum injection pressure based on data provided pursuant to paragraph (a)(2)(ii) of this section the owner or operator shall:

(i) Limit injection pressure to a value which will not exceed the operating requirements of § 144.28(f)(3)(ii); and

(ii) Submit data acceptable to the Regional Administrator which defines the fracture pressure of the formation in which injection is taking place. A single test may be submitted on behalf of two or more operators conducting operations in the same formation, if the Regional Administrator approves such submission. The data shall be submitted to the Regional Administrator within 1 year of the effective date of this program.

(b) *Casing and cementing.* Where the Regional Administrator determines that the owner or operator of an existing enhanced recovery or hydrocarbon storage well may not be in compliance with the requirements of §§ 144.28(e) and 146.22, the owner or operator shall comply with paragraphs (b) (1) through (4) of this section, when required by the Regional Administrator:

(1) Protect USDWs by:

(i) Cementing surface casing by recirculating the cement to the surface from a point 50 feet below the lowermost USDW; or

(ii) Isolating all USDWs by placing cement between the outermost casing and the well bore; and

(2) Isolate any injection zones by placing sufficient cement to fill the calculated space between the casing and the well bore to a point 250 feet above the injection zone; and

(3) Use cement:

(i) Of sufficient quantity and quality to withstand the maximum operating pressure;

(ii) Which is resistant to deterioration from formation and injection fluids; and

(iii) In a quantity no less than 120% of the calculated volume necessary to cement off a zone.

(4) The Regional Administrator may specify other requirements in addition to or in lieu of the requirements set forth in paragraphs (b) (1) through (3) as needed to protect USDWs.

Subpart D—Arizona

§ 147.150 State-administered program. [Reserved]

§ 147.151 EPA-administered program.

(a) *Contents.* The UIC program that applies to all injection activities in Arizona, including those on Indian lands, is administered by EPA. The UIC program for Navajo lands consists of the requirements contained in Subpart HHH of this Part. The program for all injection activity except that on Navajo Indian land consists of the UIC program requirements of 40 CFR

Parts 124, 144, 146, and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective dates.* The effective date for the UIC program in Arizona, except for the lands of the Navajo Indians, is June 25, 1984. The effective date for the UIC program on the lands of the Navajo is November 25, 1988.

[53 FR 43086, Oct. 25, 1988]

§ 147.152 Aquifer exemptions. [Reserved]

Subpart E—Arkansas

§ 147.200 State-administered program—Class I, III, IV, and V wells.

The UIC program for Class I, III, IV and V wells in the State of Arkansas, except those wells on Indian lands, is the program administered by the Arkansas Department of Pollution Control and Ecology approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on July 6, 1982 (47 FR 29236); the effective date of this program is July 6, 1982. This program consists of the following elements, as submitted to EPA in the State's program application.

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Arkansas. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) Arkansas Water and Air Pollution Control Act, Act 472 of 1949 as amended, Arkansas Statutes Annotated sections 82-1901 through 82-1943 (1976);

(2) Act 105 of 1939, Arkansas Statutes Annotated sections 53-101 through 53-130 (1971 and Supp. 1981); Act 937 of 1979, Arkansas Statutes Annotated sections 53-1301 through 53-1320 (Supp. 1981); Act 523 of 1981;

(3) Arkansas Underground Injection Control Code, Department of Pollution Control and Ecology, promulgated January 22, 1982;

(4) General Rule and Regulations, Arkansas Oil and Gas Commission (Order No. 2-39, revised July 1972);

(5) Arkansas Hazardous Waste Management Code, Department of Pollution Control and Ecology, promulgated August 21, 1981.

(b) The Memorandum of Agreement and Addendum No. 1 to the Memorandum of Agreement, between EPA Region VI and the Arkansas Department of Pollution Control and Ecology and the Arkansas Oil and Gas Commission, signed by the EPA Regional Administrator on May 25, 1982.

(c) *Statement of legal authority.* (1) Letter from Chief Attorney, Arkansas Department of Pollution Control and Ecology, to Acting Regional Administrator, EPA Region VI, "Re: Legal Authority of the Department of Pollution Control and Ecology of the State of Arkansas to Administer an Underground Injection Control Program," July 29, 1981;

(2) Letter from Chief Attorney, Arkansas Department of Pollution Control and Ecology, to Acting Regional Counsel, EPA Region VI, "Re: Addendum to Legal Statement—Underground Injection Control Program," October 13, 1981;

(3) Letter from General Counsel, Arkansas Oil and Gas Commission, to Acting Regional Counsel, EPA Region VI, "Re: Supplemental Addendum to Legal Statement—Underground Injection Control Program," October 20, 1981;

(4) Letter from Chief Attorney, Arkansas Department of Pollution Control and Ecology, to Attorney, Office of Regional Counsel, EPA Region VI (re: status as independent legal counsel), December 31, 1981;

(5) Letter from General Counsel, Arkansas Oil and Gas Commission, t Acting Regional Counsel, EPA Regio VI, "Re: Supplemental Addendum t Legal Statement—Underground Inje tion Control Program," January 1 1982;

(6) Letter from Chief Counsel, A kansas Department of Pollution Co trol and Ecology, to Acting Region Counsel, EPA Region VI, "Re: Adde dum to Legal Statement—Und ground Injection Control Program February 15, 1982;

(7) Letter from Chief Counsel, Arkansas Department of Pollution Control and Ecology, to Acting Regional Counsel, EPA Region VI, "Re: Addendum to Legal Statement—Underground Injection Control Program," May 13, 1982.

(d) The Program Description and any other materials submitted as part of the application or as supplements thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43086, Oct. 25, 1988]

§ 147.201 State-administered program—Class II wells. [Reserved]

§ 147.205 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in Arkansas is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program for Indian lands in Arkansas is November 25, 1988.

[53 FR 43086, Oct. 25, 1988]

Subpart F—California

§ 147.250 State-administered program—Class II wells.

The UIC program for Class II wells in the State of California, except those on Indian lands, is the program administered by the California Division of Oil and Gas, approved by EPA pursuant to SDWA section 1425.

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of California. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) California Public Resources Code sections 3000–3359 (West 1972 and Supp. 1984);

(2) California Administrative Code, title 14, sections 1710 to 1724.10 (1980)

(b) The Memorandum of Agreement between EPA Region IX and the California Division of Oil and Gas, signed by the EPA Regional Administrator on September 29, 1982.

(c) *Statement of legal authority.* (1) Letter from California Deputy Attorney General to the Administrator of EPA, "Re: Legal Authority of California Division of Oil and Gas to Carry Out Class II Injection Well Program," April 1, 1981;

(2) Letter from California Deputy Attorney General to Chief of California Branch, EPA Region IX, "Re: California Application for Primacy, Class II UIC Program," December 3, 1982.

(d) The Program Description and any other materials submitted as part of the application or as supplements thereto.

[49 FR 20197, May 11, 1984, as amended at 52 FR 17681, May 11, 1987]

§ 147.251 EPA-administered program—Class I, III, IV and V wells and Indian lands.

(a) *Contents.* The UIC program for the State of California for Class I, III, IV and V wells, and for all classes of wells on Indian lands, is administered by EPA. The program consists of the UIC program requirements of 40 CFR Parts 124, 144, and 146 and additional requirements set forth in the remainder of this subpart. Injection well owners and operators, and EPA shall comply with these requirements.

(b) *Effective dates.* The effective date for the UIC program for all lands in California, including Indian lands, is June 25, 1984.

[52 FR 17681, May 11, 1987]

§ 147.252 Aquifer exemptions. [Reserved]

§ 147.253 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells authorized by rule.

Maximum injection pressure. The owner or operator shall limit injection pressure to the lesser of:

(a) A value which will not exceed the operating requirements of § 144.28(f)(3) (i) or (ii) as applicable; or

(b) A value for well head pressure calculated by using the following formula:

$Pm = (0.733 - 0.433\ Sg)d$
where

Pm = injection pressure at the well head in pounds per square inch
Sg = specific gravity of inject fluid (unitless)
d = injection depth in feet.

Subpart G—Colorado

§ 147.300 State-administered program. [Reserved]

§ 147.301 EPA-administered program—Class I, III, IV, V wells and Indian lands.

(a) *Contents.* The UIC program for Class I, III, IV, and V wells on all lands in Colorado, including Indian lands, and for Class II wells on Indian lands, is administered by EPA. The program for all EPA-administered wells in Colorado other than Class II wells on lands of the Ute Mountain Ute consists of the UIC program requirements of 40 CFR Parts 124, 144, and 146 and the additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective dates.* The effective date for the UIC program on all lands in Colorado, including Indian lands, except for Class II wells on lands of the Ute Mountain Ute, is June 25, 1984.

[52 FR 17681, May 11, 1987]

§ 147.302 Aquifer exemptions.

(a) This section identifies any aquifers of their portions exempted in accordance with §§ 144.7(b) and 146.4 of this chapter at the time of program promulgation. EPA may in the future exempt other aquifers or portions according to applicable procedures without codifying such exemptions in this section. An updated list of exemptions will be maintained in the Regional office.

(b) For all aquifers into which existing Class II wells are injecting, those portions within a ¼ mile radius of the well are exempted for the purpose of Class II injection activities only.

§ 147.303 Existing Class I, II (except
hanced recovery and hydrocarbon st
age) and III wells authorized by rule

Maximum injection pressure. T
owner or operator shall limit injecti
pressure to the lesser of:

(a) A value which will not exceed t
operating requirements
§ 144.28(f)(3) (i) or (ii) as applicable;

(b) A value for wellhead pressu
calculated by using the following f
mula;

$Pm = (0.733 - 0.433\ Sg)d$

where:

Pm = injection pressure at the wellhead
pounds per square inch
Sg = specific gravity of injected fluid (un
less)
d = injection depth in feet.

§ 147.304 Existing Class II enhanced
covery and hydrocarbon storage we
authorized by rule.

(a) *Maximum injection pressure.* (
To meet the operating requirements
§ 144.28(f)(3)(ii) (A) and (B) of th
chapter, the owner or operator:

(i) Shall use an injection pressure
greater than the pressure establishe
by the Regional Administrator for th
field or formation in which the well
located. The Regional Administrato
shall establish such a maximum pre
sure after notice, opportunity for com
ment, and opportunity for a publ
hearing, according to the provisions
Part 124, Subpart A of this chapte
and will inform owners and operato
in writing of the applicable maximu
pressure; or

(ii) May inject at pressures greate
than those specified in paragrap
(a)(1)(i) of this section for the field o
formation in which he is operatin
provided he submits a request in wri
ing to the Regional Administrator an
demonstrates to the satisfaction of th
Regional Administrator that such in
jection pressure will not violate the re
quirements of § 144.28(f)(3)(ii) (A) an
(B). The Regional Administrator ma
grant such a request after notice, op
portunity for comment, and opportu
nity for a public hearing, according t
the provisions of Part 124, Subpart
of this chapter.

(2) Prior to such time as the Region
al Administrator establishes rules fo

maximum injection pressures based on data provided pursuant to paragraph (a)(2)(ii) of this section the owner or operator shall:

(i) Limit injection pressure to a value which will not exceed the operating requirements of § 144.28(f)(3)(ii); and

(ii) Submit data acceptable to the Regional Administrator which defines the fracture pressure of the formation in which injection is taking place. A single test may be submitted on behalf of two or more operators conducting operations in the same formation, if the Regional Administrator approves such submission. The data shall be submitted to the Regional Administrator within one year of the effective date of this program.

(b) *Casing and cementing.* Where the Regional Administrator determines that the owner or operator of an existing enhanced recovery or hydrocarbon storage well may not be in compliance with the requirements of §§ 144.28(e) and 146.22, the owner or operator shall comply with paragraphs (b) (1) through (4) of this section, when required by the Regional Administrator:

(1) Protect USDWs by:

(i) Cementing surface casing by recirculating the cement to the surface from a point 50 feet below the lowermost USDW; or

(ii) Isolating all USDWs by placing cement between the outermost casing and the well bore; and

(2) Isolate any injection zones by placing sufficient cement to fill the calculated space between the casing and the well bore to a point 250 feet above the injection zone; and

(3) Use cement:

(i) Of sufficient quantity and quality to withstand the maximum operating pressure;

(ii) Which is resistent to deterioration from formation and injection fluids; and

(iii) In quantity no less than 120% of the calculated volume necessary to cement off a zone.

(4) The Regional Administrator may specify other requirements in addition to or in lieu of the requirements set forth in paragraphs (b) (1) through (3) as needed to protect USDWs.

§ 147.305 Requirements for all wells.

(a) The owner or operator converting an existing well to an injection well shall check the condition of the casing with one of the following logging tools:

(1) A Pipe analysis log; or

(2) A Caliper log.

(b) The owner or operator of a new injection well cased with plastic (PVC, ABS, and others) casings shall:

(1) Not construct a well deeper than 500 feet;

(2) Use cement and additives compatible with such casing material;

(3) Cement the annular space above the injection interval from the bottom of the blank casing to the surface.

(c) The owner or operator of a newly drilled well shall install centralizers as directed by the Regional Administrator.

(d) The owner or operator shall as required by the Regional Administrator:

(1) Protect USDWs by:

(i) Setting surface casing 50 feet below the base of the lowermost USDW;

(ii) Cementing surface casing by recirculating the cement to the surface from a point 50 feet below the lowermost USDW; or

(iii) Isolating all USDWs by placing cement between the outermost casing and the well bore; and

(2) Isolate any injection zones by placing sufficient cement to fill the calculated space between the casing and the well bore to a point 250 feet above the injection zone; and

(3) Use cement:

(i) Of sufficient quantity and quality to withstand the maximum operating pressure;

(ii) Which is resistant to deterioration from formation and injection fluids; and

(iii) In a quantity no less than 120% of the calculated volume necessary to cement off a zone.

(4) The Regional Administrator may approve alternate casing and cementing practices provided that the owner or operator demonstrates that such practices will adequately protect USDWs.

(e) *Area of review.* Notwithstanding the alternatives presented in § 146.6 of this chapter, the area of review shall be a fixed radius as described in § 146.6(b) of this chapter.

(f) The applicant must give separate notice of intent to apply for a permit to each owner or tenant of the land within one-quarter mile of the site. The addresses of those to whom notice is given, and a description of how notice is given, shall be submitted with the permit application. The notice shall include:

(1) Name and address of applicant;

(2) A brief description of the planned injection activities, including well location, name and depth of the injection zone, maximum injection pressure and volume, and fluid to be injected;

(3) EPA contact person; and

(4) A statement that opportunity to comment will be announced after EPA prepares a draft permit. This requirement may be waived by the Regional Administrator when he determines that individual notice to all land owners and tenants would be impractical.

Subpart H—Connecticut

§§ 147.350—147.352 [Reserved]

§ 147.353 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in Connecticut is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program for Indian lands in Connecticut is November 25, 1988.

[53 FR 43086, Oct. 25, 1988]

§§ 147.354—147.359 [Reserved]

Subpart I—Delaware

§§ 147.400—147.402 [Reserved]

§ 147.403 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in Delaware is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program for Indian lands in Delaware is November 25, 1988.

[53 FR 43086, Oct. 25, 1988]

§§ 147.404—147.449 [Reserved]

Subpart J—District of Columbia

§ 147.450 State-administered program. [Reserved]

§ 147.451 EPA-administered program.

(a) *Contents.* The UIC program for the District of Columbia, including any Indian lands in the District, is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program for Indian lands in the District of Columbia is November 25, 1988. The effective date for the UIC program in the rest of the District is June 25, 1984.

[53 FR 43087, Oct. 25, 1988]

§ 147.452 Aquifer exemptions. [Reserved]

Subpart K—Florida

§ 147.500 State-administered program Class I, III, IV, and V wells.

The UIC program for Class I, III, I and V wells in the State of Flori except for those on Indian lands is administered by the Florida Department of Environmental Regulations, approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on February 7, 1983 (48 FR 5556); the effective date of this program is March 9, 1983. This program consists of the following elements, as submitted to EPA in the State's program application:

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Florida. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) Florida Air and Water Pollution Control Act, Florida Statutes Annotated sections 403.011 through 403.90 (1973 and Supp. 1983);

(2) Chapters 17 to 28, Underground Injection Control, Florida Administrative Code sections 17-28.11 through 17-28.64 (Supp. 1982).

(b) *Other laws.* The following statutes and regulations although not incorporated by reference, also are part of the approved State-administered program:

(1) Administrative Procedures Act, Florida Statutes Chapter 120;

(2) Florida Administrative Code, Chapter 17-1 (1982) (Administrative Procedures Act);

(3) Florida Administrative Code, Chapter 17-3 (1982) (Water Quality Standards);

(4) Florida Administrative Code, Chapter 17-4 (1982) (Permits);

(5) Florida Administrative Code, Chapter 28-5 (1982) (Decisions Determining Substantial Interests);

(6) Florida Administrative Code, Chapter 28-6 (1982) (Licensing);

(c) The Memorandum of Agreement between EPA Region IV and the Florida Department of Environmental Regulation, signed by the EPA Regional Administrator on March 31, 1983.

(d) *Statement of legal authority.* (1) "Statement of Legal Authority for Implementation of Underground Injection Control Program" and accompanying certifications, signed by General Counsel for the Florida Department of Environmental Regulation, January 14, 1982;

(2) "Addendum to Statement of Legal Authority for Implementation of Underground Injection Control Program" and accompanying certifications, signed by Acting General Counsel for the Florida Department of Environmental Regulation, September 20, 1982.

(e) The Program Description and any other materials submitted as part of the original application or as supplements thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43087, Oct. 25, 1988]

§ 147.501 EPA-administered program—Class II wells and Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands and for Class II wells on non-Indian lands in the State of Florida is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, and 146 and the additional requirements set forth in the remainder of this subpart. Injection well owners and EPA shall comply with these requirements.

(b) *Effective dates.* The effective date of the UIC program for Indian lands in Florida is November 25, 1988. The effective date for Class II wells on non-Indian lands is December 30, 1984.

[53 FR 43087, Oct. 25, 1988]

§ 147.502 Aquifer exemptions. [Reserved]

§ 147.503 Existing Class II (except enhanced recovery and hydrocarbon storage) wells authorized by rule.

Maximum injection pressure. To meet the operating requirements of § 144.28(f)(3)(i) of this chapter, the owner or operator shall use an injection pressure at the well head no greater than the pressure calculated using the following formula:

$Pm=(0.733-0.433\ Sg)d$

where

Pm=injection pressure at the well head in pounds per square inch

Sg=specific gravity of injected fluid (unitless)

d=injection depth in feet.

[49 FR 45306, Nov. 15, 1984]

§ 147.504 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.

(a) *Maximum injection pressure.* (*1*) To meet the operating requirements of § 144.28(f)(3)(ii) (A) and (B) of this chapter, the owner or operator:

(i) Shall use an injection pressure no greater than the pressure established by the Regional Administrator for the field or formation in which the well is located. The Regional Administrator shall establish such a maximum pressure after notice, opportunity for comment and opportunity for a public hearing, according to the provisions of Part 124, Subpart A of this chapter, and will inform owners and operators in writing of the applicable maximum pressure; or

(ii) May inject at pressure greater than those specified in paragraph (a)(1)(i) of this section for the field or formation in which he is operating provided he submits a request in writing to the Regional Administrator, and demonstrates to the satisfaction of the Regional Administrator that such injection pressure will not violate the requirement of § 144.28(f)(3)(ii) (A) and (B). The Regional Administrator may grant such a request after notice, opportunity for comment, and opportunity for a public hearing, according to the provisions of Part 124, Subpart A of this chapter.

(2) Prior to such time as the Regional Administrator establishes rules for maximum injection pressure based on data provided pursuant to paragraph (a)(2)(ii) of this section the owner or operator shall:

(i) Limit injection pressure to a value which will not exceed the operating requirements of § 144.28(f)(3)(ii); and

(ii) Submit data acceptable to the Regional Administrator which defines the fracture pressure of the formation in which injection is taking place. A single test may be submitted on behalf of two or more operators conducting operations in the same formation, if the Regional Administrator approves such submission. The data shall be submitted to the Regional Administrator within 1 year of the effective date of this program.

(b) *Casing and cementing.* Where the Regional Administrator determines that the owner or operator of an existing enhanced recovery or hydrocarbon storage well may not be in compliance with the requirements of §§ 144.28(e) and 146.22, the owner or operator shall, when required by the Regional Administrator:

(1) Protect USDWs by:

(i) Cementing surface casing by recirculating the cement to the surface from a point 50 feet below the lowermost USDW; or

(ii) Isolating all USDWs by placing cement between the outermost casing and the well bore; and

(2) Isolate any injection zones by placing sufficient cement to fill the calculated space between the casing and the well bore to a point 250 feet above the injection zone; and

(3) Use cement:

(i) Of sufficient quantity and quality to withstand the maximum operating pressure;

(ii) Which is resistant to deterioration from formation and injection fluids; and

(iii) In a quantity no less than 120% of the calculated volume necessary to cement off a zone.

(4) Comply with other requirements which the Regional Administrator may specify either in addition to or in lieu of the requirements set forth in paragraphs (b)(1) through (3) of this section as needed to protect USDWs.

(c) *Area of review.* Notwithstanding the alternatives presented in § 146.06 of this chapter, the area of review shall be a minimum fixed radius as described in § 146.06(b) of this chapter.

(The information collection requirements contained in paragraph (a)(2)(ii) were appoved by the Office of Management and Budget under control number 2040-0042)

[49 FR 45306, Nov. 15, 1984]

Subpart L—Georgia

§§ 147.550—147.552 [Reserved]

§ 147.553 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in Georgia is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, and 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program for Indian lands in Georgia is November 25, 1988.

[53 FR 43087, Oct. 25, 1988]

§§ 147.554—147.559 [Reserved]

Subpart M—Hawaii

§ 147.600 State-administered program. [Reserved]

§ 147.601 EPA-administered program.

(a) *Contents.* The UIC program for the State of Hawaii, including all Indian lands, is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, and 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program for Indian lands in Hawaii is November 25, 1988. The effective date for the UIC program for all other lands in Hawaii is December 30, 1984.

[53 FR 43087, Oct. 25, 1988]

Subpart N—Idaho

§ 147.650 State-administrative program—Class I, II, III, IV, and V wells.

The UIC program for Class I, II, III, IV, and V wells in the State of Idaho, other than those on Indian lands, is the program administered by the Idaho Department of Water Resources, approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on June 7, 1985; the effective date of this program is July 22, 1985. This program consists of the following elements, as submitted to EPA in the State's program application.

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Idaho. This incorporation by reference was approved by the Director of the FEDERAL REGISTER effective July 22, 1985.

(1) Public Writings, Title 9, Chapter 3, Idaho Code, sections 9-301 through 9-302 (Bobbs-Merrill 1979);

(2) Crimes and Punishments, Title 18, Chapter 1, Idaho Code, sections 18-113 through 18-114 (Bobbs-Merrill 1979 and Supp. 1984);

(3) Department of Health and Welfare, Title 39, Chapter 1, Idaho Code, Chapter 39-108 (Bobbs-Merrill 1977);

(4) Drainage-Water Rights and Reclamation, Title 42, Chapter 2, Idaho Code sections 42-237(e); section 42-238 (Bobbs-Merrill 1977 and Supp. 1984);

(5) Department of Water Resources-Water Resources Board, Title 42, Chapter 17, Idaho Code, sections 42-1701, 42-1703, 42-1735 (Bobbs-Merrill 1977, section 42-1701A (Supp. 1984);

(6) Director of Department of Water Resources, Title 42, Chapter 18, Idaho Code, sections 42-1801 through 42-1805 (Bobbs-Merrill 1977);

(7) Waste Disposal and Injection Wells, Title 42, Chapter 39, Idaho Code, sections 42-3901 through 42-3914 (Bobbs-Merrill 1977), sections 42-3915 through 42-3919 (Supp. 1984);

(8) Idaho Trade Secrets Act, Title 48, Chapter 8, Idaho Code, sections 48-801 through 48-807 (Bobbs-Merrill 1977 and Supp. 1984);

(9) Administrative Procedure, Title 67, Chapter 52, Idaho Code, sections 67-5201 through 67-5218 (Bobbs-Merrill 1980 and Supp. 1984);

(10) Idaho Radiation Control Regulations (IRCR section 1-9002.70; sections 1-9100 through 1-9110, Department of Health and Welfare (May 1981);

(11) Rules and Regulations: Construction and Use of Injection Wells, Idaho Department of Water Resources, Rules 1 through 14 (August 1984);

(12) Rules and Regulations: Practice and Procedures, Idaho Department of Water Resources, Rules 1 through 14 (October 1983).

(b) The Memorandum of Agreement between EPA and Region X and the Idaho Department of Water Resources signed by the EPA Regional Administrator on February 11, 1985.

(c) *Statement of legal authority.* (1) The Idaho Attorney General's Statement for the Underground Injection Control Program, October 31, 1984.

(2) Letter from David J. Barber, Deputy Attorney General, Idaho Department of Water Resources to Harold Scott, EPA, Region 10, revising the Attorney General's Statement, February 14, 1985.

(d) The Program Description and any other materials submitted as part of the application or as supplements thereto.

[50 FR 23957, June 7, 1985]

§ 147.651 EPA-administered program.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in Idaho is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective dates.* The effective date of the UIC program for Indian lands in Idaho is June 11, 1984.

[52 FR 17681, May 11, 1987]

§ 147.652 Aquifer exemptions. [Reserved]

Subpart O—Illinois

§ 147.700 State-administered program—Class I, III, IV, and V wells.

The UIC program for Class I, III, IV and V wells in the State of Illinois, except those on Indian lands, is the program administered by the Illinois Environmental Protection Agency, approved by EPA pursuant to section 1422 of the SDWA. Notice of the approval was published in the FEDERAL REGISTER on February 1, 1984 (49 FR 3991); the effective date of this program is March 3, 1984. This program consists of the following elements, as submitted to EPA in the State's program application:

(a) *Incorporation by reference.* The requirements set forth in the state statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Illinois. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) Illinois Environmental Protection Act, Illinois ch. 111½, sections 1001 to 1051 (Smith-Hurd 1977 Revised Statutes and Supp. 1983), as amended by Public Act No. 83-431, 1983 Illinois Legislative Service, pages 2910 to 2916 (West);

(2) Illinois Pollution Control Board Rules and Regulations at Title 35, Illinois Administrative Code, Chapter I, Part 700, Outline of Waste Disposal Regulations; Part 702, RCRA and UIC Permit Programs; Part 704, UIC Permit Program; Part 705, Procedures for Permit Issuance and Part 730, Underground Injection Control Operating Requirements as amended by IPCB Order No. R-83039 on December 15, 1983.

(b) The Memorandum of Agreement between EPA Region V and the Illinois Environmental Protection Agency, signed by the EPA Regional Administrator on March 22, 1984.

(c) *Statement of legal authority.* Letter from Illinois Attorney General to Regional Administrator, EPA Region V, and attached statement, December 16, 1982.

(d) The Program Description and any other materials submitted as par of the application or as supplement thereto.

[49 FR 20197, May 11, 1984, as amended a 53 FR 43087, Oct. 25, 1988]

§ 147.701 State-administered program-Class II wells.

The UIC program for Class II well in the State of Illinois, except thos on Indian lands, is the program administered by the Illinois Environmental Protection Agency, approved by EPA pursuant to section 1425 of the SDWA. Notice of the approval was published in the FEDERAL REGISTER on February 1, 1984 (49 FR 3990); the effective date of this program is March 3, 1984. This program consists of the following elements, as submitted to EPA in the state's program application:

(a) *Incorporation by reference.* The requirements set forth in the State Statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Illinois. This incorporation by reference was approved by the Director of the FEDERAL REGISTER on June 25, 1984.

(1) Conservation of Oil and Gas, etc., Illinois Revised Statutes ch. 96½, sections 5401 to 5457 (Smith-Hurd 1979 and Supp. 1983), as amended by Public Act No. 83-1074 1983 Illinois Legislative Service pages 7183 to 7185 (West);

(2) Illinois Environmental Protection Act, Illinois Revised Statutes ch. 111½, sections 1001-1051 (Smith-Hurd 1977 and Supp. 1983), as amended by Public Act No. 83-431, 1983 Illinois Legislative Services pages 2910 to 2916 (West);

(3) Illinois Revised Statutes ch. 100½, section 26 (Smith-Hurd Supp. 1983);

(4) Illinois Department of Mines and Minerals Regulations for the Oil and Gas Division, Rules I, II, IIA, III, V, VII, and IX (1981).

(b) The Memorandum of Agreement between EPA Region V and the Illinois Department of Mines and Minerals, signed by the EPA Regional Administrator on March 22, 1984.

(c) *Statement of legal authority.* "Certification of Legal Authority," signed by State Attorney, Richland County, Illinois, May 5, 1982.

(d) The Program Description and any other materials submitted as part of the application or as supplements thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43087, Oct. 25, 1988]

§ 147.703 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for the State of Illinois on Indian lands in Illinois is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, and 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and EPA shall comply with these requirements.

(b) *Effective dates.* The effective date for the UIC program for Indian lands is November 25, 1988.

[53 FR 43087, Oct. 25, 1988]

Subpart P—Indiana

§ 147.750 State-administered program. [Reserved]

§ 147.751 EPA-administered program.

(a) *Contents.* The UIC program for the State of Indiana, including all Indian lands, is administered by EPA. The program consists of the UIC program requirements of 40 CFR Parts 124, 144, and 146 and the additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective dates.* The effective date for the UIC program on Indian lands is November 25, 1988. The effective date of the UIC program for the rest of Indiana is June 25, 1984.

[53 FR 43087, Oct. 25, 1988]

§ 147.752 Aquifer exemptions. [Reserved]

§ 147.753 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells authorized by rule.

Maximum injection pressure. The owner or operator shall limit injection pressure to the lessor of:

(a) A value which will not exceed the operating requirements of § 144.28(f)(3) (i) or (ii) as applicable; or

(b) A value for well head pressure calculated by using the following formula:

$Pm = (0.800 - 0.433\ Sg)d$

where:

Pm=injection pressure at the wellhead in pounds per square inch

Sg=specific gravity of injected fluid (unitless)

d=injection depth in feet.

§ 147.754 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.

(a) *Maximum injection pressure.* (1) To meet the operating requirements of § 144.28(f)(3)(ii) (A) and (B) of this chapter, the owner or operator:

(i) Shall use an injection pressure no greater than the pressure established by the Regional Administrator for the field or formation in which the well is located. The Regional Administrator shall establish such a maximum pressure after notice, opportunity for comment, and opportunity for a public hearing, according to the provisions of Part 124, Subpart A of this chapter, and will inform owners and operators in writing of the applicable maximum pressure; or

(ii) May inject at pressures greater than those specified in paragraph (a)(1)(i) of this section for the field or formation in which he is operating, provided he submits a request in writing to the Regional Administrator and demonstrates to the satisfaction of the Regional Administrator that such injection pressure will not violate the requirements of § 144.28(f)(3)(ii) (A) and (B). The Regional Administrator may grant such a request after notice, opportunity for comment, and opportunity for a public hearing, according to the provisions of Part 124, Subpart A of this chapter.

(2) Prior to such time as the Regional Administrator establishes rules for maximum injection pressure based on data provided pursuant to paragraph (a)(2)(ii) of this section the owner or operator shall:

(i) Limit injection pressure to a value which will not exceed the operating requirements of § 144.28(f)(3)(ii); and

(ii) Submit data acceptable to the Regional Administrator which defines the fracture pressure of the formation in which injection is taking place. A single test may be submitted on behalf of two or more operators conducting operations in the same formation, if the Regional Administrator approves such submission. The data shall be submitted to the Regional Administrator within one year of the effective date of this program.

(b) *Casing and cementing.* Where the Regional Administrator determines that the owner or operator of an existing enhanced recovery or hydrocarbon storage well may not be in compliance with the requirements of §§ 144.28(e) and 146.22, the owner or operator shall comply with paragraphs (b)(1) through (4) of this section, when required by the Regional Administrator:

(1) Protect USDWs by:

(i) Cementing surface casing by recirculating the cement to the surface from a point 50 feet below the lowermost USDW; or

(ii) Isolating all USDWs by placing cement between the outermost casing and the well bore; and

(2) Isolate any injection zones by placing sufficient cement to fill the calculated space between the casing and the well bore to a point 250 feet above the injection zone; and

(3) Use cement:

(i) Of sufficient quantity and quality to withstand the maximum operating pressure;

(ii) Which is resistant to deterioration from formation and injection fluids; and

(iii) In a quantity no less than 120% of the calculated volume necessary to cement off a zone.

(4) The Regional Administrator may specify other requirements in addition to or in lieu of the requirements set forth in paragraphs (b) (1) through (3) of this section, as needed to protect USDWs.

§ 147.755 Requirements for all wells.

(a) *Area of review.* Notwithstanding the alternatives presented in § 146.6 of this chapter, the area of review for Class II wells shall be a fixed radius as described in § 146.6(b) of this chapter.

(b) *Tubing and packer.* The owner or operator of an injection well injecting salt water for disposal shall inject through tubing and packer. The owner or operator of an existing well must comply with this requirement within one year of the effective date of this program.

Subpart Q—Iowa

§ 147.800 State-administered program. [Reserved]

§ 147.801 EPA-administered program.

(a) *Contents.* The UIC program for the State of Iowa, including Indian lands, is administered by EPA. This program consists of the requirements of 40 CFR Parts 124, 144, and 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective dates.* The effective date for the UIC program for all lands in Iowa, including Indian lands, is June 25, 1984.

[52 FR 17681, May 11, 1987]

§ 147.802 Aquifer exemptions. [Reserved]

Subpart R—Kansas

§ 147.850 State-administered program—Class I, III, IV and V wells.

The UIC program for Class I, III, IV and V wells in the State of Kansas, except those on Indian lands as described in § 147.860, is the program administered by the Kansas Department of Health and Environment, approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the Federal Register on December 2, 1983 (48 FR 54350); the effective date of this program is December 2, 1983. This program consists of the following elements, as submitted to EPA in the State's program application.

[49 FR 45306, Nov. 15, 1984]

§ 147.851 State-administered program—Class II wells.

The UIC program for Class II wells in the State of Kansas, except those on Indian lands as described in § 147.860, is the program administered by the Kansas Corporation Commission and the Kansas Department of Health and Environment, approved by EPA pursuant to section 1425 of the SDWA. Notice of this approval was published in the Federal Register on February 8, 1984 (49 FR 4735); the effective date of this program is February 8, 1984. This program consists of the following elements, as submitted to EPA in the State's program application.

[49 FR 45306, Nov. 15, 1984]

§§ 147.852—147.859 [Reserved]

§ 147.860 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in Kansas is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, and 146, and additional requirements set forth in the remainder of this subpart. Injection well owners and operators, and EPA, shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program for Indian lands in Kansas is December 30, 1984.

[49 FR 45307, Nov. 15, 1984]

Subpart S—Kentucky

§ 147.900 State-administered program. [Reserved]

§ 147.901 EPA-administered program.

(a) *Contents.* The UIC program for the Commonwealth of Kentucky, including all Indian lands, is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144 and 146 and the additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective dates.* The effective date for the UIC program on Indian lands is November 25, 1988. The effective date for the UIC program in the remainder of Kentucky is June 25, 1984.

[53 FR 43087, Oct. 25, 1988]

§ 147.902 Aquifer exemptions. [Reserved]

§ 147.903 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells authorized by rule.

Maximum injection pressure. The owner or operator shall limit injection pressure to the lesser of:

(a) A value which will not exceed the operating requirements of § 144.28(f)(3) (i) or (ii) as applicable or;

(b) A value for well head pressure calculated by using the following formula:

$Pm=(0.733-0.433\ Sg)d$

where

Pm = injection pressure at the well head in pounds per square inch

Sg = specific gravity of inject fluid (unitless)

d = injection depth in feet.

§ 147.904 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.

(a) *Maximum injection pressure.* (1) To meet the operating requirements of § 144.28(f)(3)(ii) (A) and (B) of this chapter, the owner or operator:

(i) Shall use an injection pressure no greater than the pressure established by the Regional Administrator for the field or formation in which the well is located. The Regional Administrator shall establish such a maximum pressure after notice, opportunity for comment, and opportunity for a public hearing, according to the provisions of Part 124, Subpart A of this chapter, and will inform owners and operators in writing of the applicable maximum pressure; or

(ii) May inject at pressures greater than those specified in paragraph (a)(1)(i) of this section for the field or formation in which he is operating provided he submits a request in writing to the Regional Administrator, and demonstrates to the satisfaction of the Regional Administrator that such injection pressure will not violate the requirement of § 144.28(f)(3)(ii) (A) and (B). The Regional Administrator may grant such a request after notice, opportunity for comment, and opportunity for a public hearing, according to the provisions of Part 124, Subpart A of this chapter.

(2) Prior to such time as the Regional Administrator establishes rules for maximum injection pressure based on data provided pursuant to paragraph (a)(2)(ii) of this section the owner or operator shall:

(i) Limit injection pressure to a value which will not exceed the operating requirements of § 144.28(f)(3)(ii); and

(ii) Submit data acceptable to the Regional Administrator which define the fracture pressure of the formation in which injection is taking place. A single test may be submitted on behal of two or more operators conductin operations in the same formation, i the Regional Administrator approve such submission. The data shall b submitted to the Regional Administrator within 1 year of the effective dat of this program.

(b) *Casing and Cementing.* Wher the Regional Administrator determines that the owner or operator o an existing enhanced recovery or hydrocarbon storage well may not be i compliance with the requirements o §§ 144.28(e) and 146.22, the owner o operator shall comply with paragraph (b) (1) through (4) of this sectio when required by the Regional Admi istrator:

(1) Protect USDWs by:

(i) Cementing surface casing by r circulating the cement to the surfa from a point 50 feet below the lowe most USDW; or

(ii) Isolating all USDWs by placi cement between the outermost casi and the well bore; and

(2) Isolate any injection zones placing sufficient cement to fill t calculated space between and t casing the well bore to a point 250 fe above the injection zone; and

(3) Use cement:

(i) Of sufficient quantity and quali to withstand the maximum operati pressure;

(ii) Which is resistant to deterio tion from formation and injecti fluids; and

(iii) In a quantity no less than 12 of the calculated volume necessary cement off a zone.

(4) The Regional Administrator m specify other requirements in addit to or in lieu of the requirements forth in paragraphs (b) (1) through

of this section, as needed to protect USDWs.

§ 147.905 Requirements for all wells—area of review.

Notwithstanding the alternatives presented in § 146.6 of this chapter, the area of review shall be a minimum fixed radius as described in § 146.6(b) of this chapter.

Subpart T—Louisiana

§ 147.950 State-administered program.

The UIC program for Class I, II, III, IV, and V wells in the State of Louisiana is the program administered by the Louisiana Department of Natural Resources, approved by EPA pursuant to sections 1422 and 1425 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on April 23, 1982 (47 FR 17487); the effective date of this program is March 23, 1982. This program consists of the following elements, as submitted to EPA in the State's program application:

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Louisiana. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) Louisiana Revised Statutes Annotated sections 30:1-30:24 (1975 and Supp. 1982);

(2) Underground Injection Control Program Regulations for Class I, III, IV and V Wells, Statewide Order No. 29-N-1 (January 13, 1982);

(3)(i) Statewide Order Governing the Drilling for and Producing of Oil and Gas in the State of Louisiana, Statewide Order No. 29-B (August 26, 1974) (Composite Order Incorporating Amendments through March 1, 1974);

(ii) Amendments to Statewide Order No. 29-B (Off-site Disposal of Drilling Mud and Salt Water Generated from Drilling and Production of Oil and Gas Wells) (effective July 20, 1980);

(iii) Amendment to Statewide Order No. 29-B (Amendment concerning the use of Tables 5A and 6A, etc.) (December 15, 1980, effective January 1, 1981);

(4) (i) Statewide Order adopting rules and regulations pertaining to the use of salt dome cavities (i.e., storage chambers) for storage of liquid and/or gaseous hydrocarbons, etc., Statewide Order No. 29-M (July 6, 1977, effective July 20, 1977);

(ii) Supplement to Statewide Order No. 29-M (October 2, 1978);

(iii) Second Supplement to Statewide Order No. 29-M (June 8, 1979).

(b) (1) The Memorandum of Agreement (Class I, III, IV and V wells) between EPA Region VI and the Louisiana Department of Natural Resources, Office of Conservation, signed by the EPA Regional Administrator on March 17, 1982;

(2) The Memorandum of Agreement (Class II wells) between EPA Region VI and the Louisiana Department of Natural Resources, Office of Conservation, signed by the EPA Regional Administrator on March 17, 1982.

(c) *Statement of legal authority.* (1) Letter from Attorney General of Louisiana to EPA, "Re: Louisiana Underground Injection Control Program Authorization for State of Louisiana" (Class I, III, IV and V Wells), January 13, 1982, (10 pages);

(2) Letter from Attorney General of Louisiana to EPA, "Re: Louisiana Underground Injection Control Program Authorization for State of Louisiana" (Class II Wells), January 13, 1982 (5 pages).

(d) The Program Description and any other materials submitted as part of the application or as supplements thereto.

§ 147.951 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in Louisiana is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, and 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective dates.* The effective date of the UIC program for Indian lands in Louisiana is November 25, 1988.

[53 FR 43087, Oct. 25, 1988]

Subpart U—Maine

§ 147.1000 State-administered program.

The UIC program for all classes of wells in the State of Maine, except those on Indian lands, is the program administered by the Maine Department of Environmental Protection approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on August 25, 1983 (48 FR 38641); the effective date of this program is September 26, 1983. This program consists of the following elements, as submitted to EPA in the State's program application.

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Louisiana. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) Maine Revised Statutes Annotated title 38, sections 361-A, 363-B, 413, 414, 414-A, 420, and 1317-A (1978);

(2) Rules to Control the Subsurface Discharge of Pollutants by Well Injection, Rules of the Department of Environmental Protection, Chapter 543 (adopted June 22, 1983, effective July 4, 1983).

(b) The Memorandum of Agreement between EPA Region I and the Maine Department of Environmental Protection, signed by the EPA Regional Administrator on May 16, 1983.

(c) *Statement of legal authority.* Letter from Attorney General of Maine to EPA Regional Administrator, "Re: Attorney General's Statement: Maine Underground Injection Control Program Primacy Application," June 30, 1983.

(d) The Program Description and any other materials submitted as part of the application or as supplements thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43088, Oct. 25, 1988]

§ 147.1001 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in Maine is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective dates.* The effective date of the UIC program for Indian lands in Maine is November 25, 1988.

[53 FR 43088, Oct. 25, 1988]

Subpart V—Maryland

§§ 147.1050—147.1052 [Reserved]

§ 147.1053 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in Maryland is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, and 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program for Indian lands in Maryland is November 25, 1988.

[53 FR 43088, Oct. 25, 1988]

§§ 147.1054—147.1099 [Reserved]

Subpart W—Massachusetts

§ 147.1100 State-administered program.

The UIC program for all classes of wells in the State of Massachusetts, except those on Indian lands, is the program administered by the Massachusetts Department of Environmental Protection, approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on November 23, 1982 (47 FR 52705); the effective date of this program is December 23, 1982. This program consists of the fol-

ng elements, as submitted to EPA
e State's program application:
) *Incorporation by reference.* The
irements set forth in the State
ites and regulations cited in this
graph are hereby incorporated by
rence and made a part of the ap-
ble UIC program under the
VA for the State of Massachusetts.
incorporation by reference was
roved by the Director of the Feder-
egister on June 25, 1984.
) Massachusetts General Laws An-
ted chapter 21, sections 27, 43,
44 (West 1981);
) Code of Massachusetts Regula-
s, title 310, sections 23.01-23.11 as
nded April 26, 1982.
) The Memorandum of Agreement
veen EPA Region I and the Massa-
setts Department of Environmen-
Quality Engineering, signed by the
Regional Administrator on
ust 18, 1982.
) *Statement of legal authority.*
nderground Injection Control Pro-
m—Attorney General's Statement
Class I, II, III, IV and V Injection
lls," signed by Assistant Attorney
neral for Attorney General of Mas-
husetts, May 13, 1982.
i) The Program Description and
other materials submitted as part
the application or as supplements
ereto.

FR 20197, May 11, 1984, as amended at
R 43088, Oct. 25, 1988]

**7.1101 EPA-administered progra:n—
Indian lands.**

a) *Contents.* The UIC program for
classes of wells on Indian lands in
ssachusetts is administered by
A. This program consists of the
C program requirements of 40 CFR
rts 124, 144, 146 and any additional
quirements set forth in the remain-
r of this subpart. Injection well
ners and EPA shall comply with
ese requirements.
b) *Effective date.* The effective date
the UIC program for Indian lands
Massachusetts is November 25,
88.

FR 43088, Oct. 25, 1988]

Subpart X—Michigan

§ 147.1150 State-administered program. [Reserved]

§ 147.1151 EPA-administered program.

(a) *Contents.* The UIC program for the State of Michigan, including all Indian lands, is administered by EPA. This program consists of the program requirements of 40 CFR Parts 124, 144 and 146 and the additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective dates.* The effective date for the UIC program for all lands in Michigan, including Indian lands, is June 25, 1984.

[52 FR 17681, May 11, 1987]

§ 147.1152 Aquifer exemptions. [Reserved]

§ 147.1153 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells authorized by rule.

Maximum injection pressure. The owner or operator shall limit injection pressure to the lesser of:

(a) A value which will not exceed the operating requirements of § 144.28(f)(3) (i) or (ii) as applicable; or

(b) A value for well head pressure calculated by using the following formula:

$$Pm=(0.800-0.433\ Sg)d$$

where

Pm = injection pressure at the well head in pounds per square inch

Sg = specific gravity of injected fluid (unitless)

d = injection depth in feet.

§ 147.1154 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.

(a) *Maximum injection pressure.* (1) To meet the operating requirements of § 144.28(f)(3)(ii) (A) and (B) of this chapter, the owner or operator:

(i) Shall use an injection pressure no greater than the pressure established by the Regional Administrator for the field or formation in which the well is located. The Regional Administrator shall establish such a maximum pressure after notice, opportunity for comment, and opportunity for a public hearing, according to the provisions of Part 124, Subpart A of this chapter, and will inform owners and operators in writing of the applicable maximum pressure; or

(ii) May inject at pressures greater than those specified in paragraph (a)(1)(i) of this section for the field or formation in which he is operating provided he submits a request in writing to the Regional Administrator, and demonstrates to the satisfaction of the Regonal Administrator that such injection pressure will not violate the requirement of § 144.28(f)(3)(ii) (A) and (B). The Regional Administrator may grant such a request after notice, opportunity for comment, and opportunity for a public hearing, according to the provisions of Part 124, Subpart A of this chapter.

(2) Prior to such time as the Regional Administrator establishes field rules for maximum injection pressure based on data provided pursuant to paragraph (a)(2)(ii) of this section the owner or operator shall:

(i) Limit injection pressure to a value which will not exceed the operating requirements of § 144.28(f)(3)(ii); and

(ii) Submit data acceptable to the Regional Administrator which defines the fracture pressure of the formation in which injection is taking place. A single test may be submitted on behalf of two or more operators conducting operations in the same formation, if the Regional Administrator approves such submission. The data shall be submitted to the Regional Administrator within 1 year following the effective date of this program.

(b) *Casing and cementing.* Where the Regional Administrator determines that the owner or operator of an existing enhanced recovery or hydrocarbon storage will may not be in compliance with the requirements of §§ 144.28(e) and 146.22, the owner or operator shall comply with paragraphs (b) (1) through (4) of this section, when required by the regional Administrator:

(1) Protect USDWs by:

(i) Cementing surface casing by recirculating the cement to the surface from a point 50 feet below the lowermost USDW; or

(ii) Isolating all USDWs by placing cement between the outermost casing and the well bore; and

(2) Isolate any injection zones by placing sufficient cement to fill the calculated space between the casing and the well bore to a point 250 feet above the injection zone; and

(3) Use cement:

(i) Of sufficient quantity and quality to withstand the maximum operating pressure;

(ii) Which is resistant to deterioration from formation and injection fluids; and

(iii) In a quantity no less than 120% of the calculated volume necessary to cement off a zone.

(4) The Regional Administrator may specify other requirements in addition to or in lieu of the requirements set forth in paragraphs (b) (1) through (3) of this section, as needed to protect USDWs.

§ 147.1155 Requirements for all wells.

(a) *Area of review.* Notwithstanding the alternatives presented in § 146.6 of this chapter, the area of review for Class II wells shall be a fixed radius as described in § 146.6(b) of this chapter.

(b) *Tubing and packer.* The owner or operator of an injection well injecting salt water for disposal shall inject through tubing and packer. The owner of an existing well must comply with this requirement within one year o the effective date of this program.

Supbart Y—Minnesota

§ 147.1200 State-administered progra [Reserved]

§ 147.1201 EPA-administered program.

(a) *Contents.* The UIC program the State of Minnesota is administer by EPA. This program consists of UIC program requirements of 40 C Parts 124, 144, and 146, and additio requirements set forth in the rem der of this subpart. Injection owners and operators, and EPA, comply with these requirements.

b) *Effective date.* The effective date the UIC program for Minnesota is: ne 11, 1984.

47.1202 Aquifer exemptions. [Reserved]

47.1210 Requirements for Indian lands.

(a) *Purpose and scope.* This section ts forth additional requirements at apply to injection activities on dian lands in Minnesota.

(b) *Requirements.* Notwithstanding e other requirements of this sub- art, for Indian lands described in aragraph (a) of this section, no owner r operator shall construct, operate, aintain, or convert any Class I, II, II, or IV well. The UIC program for lass V wells on such Indian Lands is dministered by EPA, and consists of he applicable requirements of 40 CFR Parts 124, 144, and 146. In addition, no wner or operator shall abandon a well without the approval of the Regional Administrator.

(c) *Effective date.* The effective date of the UIC program requirements for Indian lands in Minnesota is December 30, 1984.

[49 FR 45307, Nov. 15, 1984]

Subpart Z—Mississippi

§ 147.1250 State-administered program—Class I, III, IV, and V wells.

The UIC program for Class I, III, IV and V wells in the State of Mississippi, except those on Indian lands, is the program administered by the Mississippi Department of Natural Resources approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on August 25, 1983 (48 FR 38641); the effective date of this program is September 26, 1983. This program consists of the following elements, as submitted to EPA in the State's program application:

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Mississippi. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) Mississippi Air and Water Pollution Control Law, Mississippi Code Annotated sections 49-17-1 through 49-17-29 (1972) and Supp. 1983);

(2) Mississippi Department of Natural Resources, Bureau of Pollution Control, Underground Injection Control Program Regulations (adopted February 11, 1982);

(3) Mississippi Department of Natural Resources, Bureau of Pollution Control, State of Mississippi Wastewater Permit Regulations for National Pollutant Discharge Elimination System (NPDES), Underground Injection Control (UIC), and State Operating Permits (adopted May 1, 1974; amended February 11, 1982).

(b) The Memorandum of Agreement between EPA Region IV and the Mississippi Department of Natural Resources, signed by the EPA Regional Administrator on February 8, 1983.

(c) *Statement of legal authority.* (1) Letter from Attorney General of Mississippi (by Special Assistant Attorney General) to Executive Director, Mississippi Department of Natural Resources, "Re: Mississippi Department of Natural Resources, Bureau of Pollution Control, State Underground Injection Control (UIC) Program; Statement of the Attorney General of the State of Mississippi," December 3, 1981;

(2) Letter from Attorney General of Mississippi (by Special Assistant Attorney General) to Executive Director, Mississippi Department of Natural Resources, "Re: Authority to Regulate and Take Samples from Underground Injection Systems," October 18, 1982;

(3) Letter from Attorney General of Mississippi (by Special Assistant Attorney General) to Regional Administrator, EPA Region IV, "Re: Public Participation in State Enforcement Actions, UIC Program," June 10, 1983.

(d) The Program Description and any other materials submitted as part of the application or supplements thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43088, Oct. 25, 1988]

§ 147.1251 State-administered program—Class II wells.

The UIC program for Class II wells in the State of Mississippi, other than those on Indian lands, is the program administered by the State Oil and Gas Board of Mississippi approved by EPA pursuant to section 1425 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on March 2, 1989; the effective date of this program is March 2, 1989. This program consists of the following elements, as submitted to EPA in the State's program application:

(a) Incorporation by reference. The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Mississippi. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a).

(1) Mississippi Code Annotated, section 5-9-9 (Supp. 1988).

(2) Mississippi Code Annotated, sections 53-1-1 through 53-1-47, inclusive and sections 53-1-71 through 53-1-77, inclusive (1972 and Supp. 1988).

(3) Mississippi Code Annotated, sections 53-3-1 through 53-3-165, inclusive (1972 and Supp. 1988).

(4) State Oil and Gas Board Statewide Rules and Regulations, Rules 1 through 65, inclusive (Aug. 1, 1987, as amended, Sept. 17, 1987).

(b) The Memorandum of Agreement between EPA Region IV and the State Oil and Gas Board of Mississippi signed by the Regional Administrator on October 31, 1988.

(c) Statement of legal authority. Statement from the Attorney General signed on October 1, 1987 with amendments to the Statement signed August 5, 1988 and September 15, 1988 by the Special Assistant Attorney General.

(d) The Program Description and any other materials submitted as part of the original application or as supplements thereto.

[54 FR 8735, Mar. 2, 1989]

§ 147.1252 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in Mississippi is administered by EPA. The program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program on Indian lands is November 25, 1988.

[53 FR 8735, Mar. 2, 1989]

Subpart AA—Missouri

§ 147.1300 State-administered program.

The UIC program for all classes o wells in the State of Missouri, excep those on Indian lands, is administere by the Missouri Department of Natu ral Resources, approved by EPA pur suant to section 1422 and 1425 of th SDWA. Notice of this approval wa published in the FEDERAL REGISTER o December 2, 1983 (48 FR 54349); th effective date of this program is De cember 2, 1983). This program consis of the following elements, as submi ted to EPA in the State's program a plication.

(a) *Incorporation by reference.* Th requirements set forth in the Sta statutes and regulations cited in th paragraph are hereby incorporated reference and made a part of the a plicable UIC program under t SDWA for the State of Missouri. Th incorporation by reference was proved by the Director of the Feder Register on June 25, 1984.

(1) Vernon's Annotated Misso Statutes sections 259.010 to 259. (Supp. 1984);

(2) Missouri Code of State Regu tions, title 10, division 50, Chapter and 2 (sections 50-1.010 through 2.120) (1982).

(b) The Memorandum of Agreem between EPA Region VII and the M souri Department of Oil and G signed by the EPA Regional Admi trator on December 3, 1982.

(c) *Statement of legal authority.* (1) Opinion Letter No. 63 and attached Memorandum Opinion, signed by Attorney General of Missouri, March 16, 1982;

(2) Addendum to Opinion Letter No. 63 (1982), signed by Attorney General of Missouri, October 28, 1982.

(3) Opinion No. 127-83, signed by Attorney General of Missouri, July 11, 1983.

(d) The Program Description and any other materials submitted as part of the application or as supplements thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43088, Oct. 25, 1988]

§ 147.1301 State-administered program—Class I, III, IV, and V wells.

The UIC program for Class I, III, IV, and V wells in the State of Missouri, other than those on Indian lands, is the program administered by the Missouri Department of Natural Resources, approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on November 2, 1984; the effective date of this program is July 31, 1985. This program consists of the following elements, as submitted to EPA in the State's program application.

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Missouri. This incorporation by reference was approved by the Director of the Federal Register effective July 31, 1985.

(1) Revised Statutes of the State of Missouri, Volume 2, sections 204.016, 204.026, 204.051, 204.056 and Volume V, section 577.155 (1978 and Cumm. Supp. 1984);

(2) Missouri Code of State Regulations, title 10, division 20, Chapter 6, sections 20-6.010, 20-6.020, 20-6.070, 20-6.080, 20-6.090, and title 10, division 20, Chapter 7, section 20-7.031 (1977, amended 1984).

(b) *Other laws.* The following statutes and regulations, although not incorporated by reference except for select sections identified in paragraph (a) of this section, are also part of the approved State-administered program.

(1) Revised Statutes of the State of Missouri, chapters 204, 260, 536, 557, 558 and 560; sections 640.130.1 and 1.020 (1978 and Cumm. Supp. 1984);

(2) Rule 52.12 Vernon's Annotated Missouri Rules (1978);

(3) Missouri Code of State Regulations, title 10, division 20, Chapters 1 through 7 (1977, amended 1984).

(c) The Memorandum of Agreement between EPA Region VII and the Missouri Department of Natural Resources, signed by the EPA Regional Administrator on October 10, 1984.

(d) *Statement of Legal Authority.* Opinion No. 123-84, signed by Attorney General of Missouri, September 24, 1984. Amended April 2, 1985.

(e) The Program Description and any other materials submitted as part of the application or as supplements thereto.

[50 FR 28942, July 17, 1985]

§ 147.1302 Aquifer exemptions. [Reserved]

§ 147.1303 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for the State of Missouri for all classes of wells on Indian lands is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, and 146 and additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date for the UIC program for Indian lands is November 25, 1988.

[53 FR 43088, Oct. 25, 1988]

Subpart BB—Montana

§ 147.1350 State-administered program. [Reserved]

§ 147.1351 EPA-administered program.

(a) *Contents.* The UIC program for the State of Montana, including all Indian lands, is administered by EPA. This program consists of the program requirements of 40 CFR Parts 124, 144, and 146 and the additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective dates.* The effective date for the UIC program on all lands in Montana, including all Indian lands, is June 25, 1984.

[52 FR 17681, May 11, 1987]

§ 147.1352 Aquifer exemptions.

Those portions of aquifers within one-quarter mile of existing Class II wells are exempted for the purpose of Class II injection activities only.

NOTE: A complete listing of the exemptions and their location is available for review in the EPA Regional Office, 1860 Lincoln Street, Denver, Colorado. An updated list of exemptions will be maintained in the Regional Office.

§ 147.1353 Existing Class I, II (except enhanced recovery hydrocarbon storage) and III wells authorized by rule.

Maximum injection pressure. The owner or operator shall limit injection pressure to the lesser of:

(a) A value which will not exceed the operating requirements of § 144.28(f)(3) (i) or (ii) as applicable or

(b) A value for well head pressure calculated by using the following formula:

$$Pm = (0.733 - 0.433\ Sg)d$$

where

Pm = injection pressure at the well head in pounds per square inch

Sg = specific gravity of inject fluid (unitless)

d = injection depth in feet.

§ 147.1354 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.

(a) *Maximum injection pressure.* (1) To meet the operating requirements of § 144.28(f)(3)(ii) (A) and (B) of this chapter, the owner or operator:

(i) Shall use an injection pressure no greater than the pressure established by the Regional Administrator for the field or formation in which the well is located. The Regional Administrator shall establish such a maximum pressure after notice, opportunity for comment, and opportunity for a public hearing, according to the provisions of Part 124, Subpart A of this chapter, and will inform owners and operators in writing of the applicable maximum pressure; or

(ii) May inject at pressures greater than those specified in paragraph (a)(1)(i) of this section for the field or formation in which he is operating provided he submits a request in writing to the Regional Administrator, and demonstrates to the satisfaction of the Regional Administrator that such injection pressure will not violate the requirement of § 144.28(f)(3)(ii) (A) and (B). The Regional Administrator may grant such a request after notice, opportunity for comment, and opportunity for a public hearing, according to the provisions of Part 124, Subpart A of this chapter.

(2) Prior to such time as the Regional Administrator established rules for maximum injection pressure based on data provided pursuant to paragraph (ii) below the owner or operator shall:

(i) Limit injection pressure to a value which will not exceed the operating requirements of § 144.28(f)(3)(ii); and

(ii) Submit data acceptable to the Regional Administrator which defines the fracture pressure of the formation in which injection is taking place. A single test may be submitted on behalf of two or more operators conducting operations in the same formation, if the Regional Administrator approves such submission. The data shall be submitted to the Regional Administrator within 1 year of the effective date of this program.

(b) *Casing and cementing.* Where the Regional Administrator determines that the owner or operator of an existing enhanced recovery or hydrocarbon storage well may not be in compliance with the requirements of §§ 144.28(e) and 146.22, the owner or operator shall when required by the Regional Administrator:

(1) Isolate all USDWs by placing cement between the outermost casing and the well bore as follows:

(i) If the injection well is east of the 108th meridian, cement the outermost casing from a point 50 feet into major shale formation underlying the uppermost USDW to the surface. Fo the purpose of this paragraph, majo shale formations are defined as th earpaw, Clagget, and Colorado formations.

(ii) If the injection well is west of he 108th meridian, cement the outermost casing to a depth of 1,000 feet, or o the base of the lowermost USDW in se as a source of drinking water vhichever is deeper. The Regional Administrator may allow an owner or operator to cement to a lesser depth if e can demonstrate to the satisfaction f the Regional Administrator that no JSDW will be affected by the injection facilities.

(2) Isolate any injection zones by placing sufficient cement to fill the calculated space between the casing and the well bore to a point 250 feet above the injection zone; and

(3) Use cement:

(i) Of sufficient quantity and quality to withstand the maximum operating pressure;

(ii) Which is resistant to deteriortion from formation and injection fluids; and

(iii) In a quantity no less than 120% of the calculated volume necessary to cement off a zone.

(4) The Regional Administrator may specify other requirements in addition to or in lieu of the requirements set forth in paragraphs (b)(1) through (3) of this section, as needed to protect USDWs.

§ 147.1355 Requirements for all wells.

(a) *Area of review.* Notwithstanding the alternatives presented in § 146.6 of this chapter, the area of review shall be a fixed radius as described in § 146.06(b) of this chapter.

(b) The applicant must give separate notice of intent to apply for a permit to each owner or tenant of the land within one-quarter mile of the site. This requirement may be waived by the Regional Administrator where individual notice to all land owners and tenants would be impractical. The addresses of those to whom notice is given, and a description of how notice was given, shall be submitted with the permit application. The notice shall include:

(1) Name and address of applicant;

(2) A brief description of the planned injection activities, including well location, name and depth of the injection zone, maximum injection pressure and volume, and fluid to be injected;

(3) EPA contact person; and

(4) A statement that opportunity to comment will be announced after EPA prepares a draft permit.

(c) Owners and operators on or within one-half mile of Indian lands shall provide notice as specified in paragraph (b) of this section, except that such notice shall be provided within a one-half mile radius of the site.

Subpart CC—Nebraska

§ 147.1400 State-administered program—Class II wells.

The UIC program for Class II wells in the State of Nebraska, except those on Indian lands, is the program administered by the Nebraska Oil and Gas Conservation Commission, approved by EPA pursuant to section 1425 of the SDWA.

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Nebraska. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) Rules and Regulations of the Nebraska Oil and Gas Conservation Commission, Rules 1 through 6 (as published by the Commission, May 1981);

(2) Nebraska Revised Statutes sections 57-903, 57-906 (Reissue 1978).

(b) *Other laws.* The following statutes and regulations, although not incorporated by reference except for select sections identified in paragraph (a) of this section, are also part of the approved state-administered program:

(1) Chapter 57, Oil and Gas Conservation, Nebraska Revised statutes sections 57-901 through 57-922 (Reissue 1978).

(c) The Memorandum of Agreement between EPA Region VII and the Nebraska Oil and Gas Conservation Commission, signed by the EPA Regional Administrator on July 12, 1982.

(d) *Statement of legal authority.* (1) "Nebraska Underground Injection Control Program, Attorney General's Statement for Class II Wells," signed by Assistant Attorney General for Attorney General of Nebraska, as submitted with "State of Nebraska Request for Administration of UIC Program," January 23, 1982;

(2) "Re: Nebraska Underground Injection Control Program, Addendum to Attorney General's Statement for Class II Wells," signed by Assistant Attorney General for Attorney General of Nebraska," undated.

(e) The Program Description and any other materials submitted as part of the application or as supplements thereto.

[49 FR 20197, May 11, 1984, as amended at 52 FR 17681, May 11, 1987]

§ 147.1401 State administered program—Class I, III, IV and V wells.

The UIC program for Class I, III, IV, and V wells in the State of Nebraska, except those on Indian lands, is the program administered by the Nebraska Department of Environmental Control, approved by EPA pursuant to section 1422 of the SDWA.

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Nebraska. This incorporation by reference was approved by the Director of the Federal Register effective June 26, 1984.

(1) Nebraska Environmental Protection Act, Revised Statutes of Nebraska sections 81-1502, 81-1506, 81-1519, and 81-1520.

(2) Nebraska Department of Environmental Control, Title 122—Rules and Regulations for Underground Injection and Mineral Production Wells, Effective Date: February 16, 1982, Amended Date: November 12, 1983; as amended by amendment approved by the Governor on March 22, 1984.

(b) *Other laws.* The following statutes and regulations although not incorporated by reference, also are part of the approved State-administered program:

(1) Nebraska Environmental Protection Act, Revised Statutes of Nebraska sections 81-1501 through 81-1533 (1981 and Supp. 1983).

(c)(1) The Memorandum of Agreement between EPA Region VII and the Nebraska Department of Environmental Control, signed by the EPA Regional Administrator on July 12, 1982.

(2) Addendum to Underground Injection Control Memorandum of Agreement signed by the EPA Regional Administrator on July 12, 1982.

(3) Amendments to the Memorandum of Agreement signed by the EPA Regional Administrator on November 22, 1983.

(d) *Statement of legal authority.* (1) "Nebraska Underground Injection Control Program, Attorney General's Statement for Class I, III, IV, and V Wells", signed by Assistant Attorney General for Attorney General of Nebraska, as submitted with "State of Nebraska Request for Administration of UIC Program, January 28, 1982;

(2) Letter from Attorney General (of Nebraska), by Assistant Attorney General, to Director, (Nebraska) Department of Environmental Control, August 7, 1981;

(3) Letter from Attorney General (of Nebraska), by Assistant Attorney General, to Director, (Nebraska) Department of Environmental Control, April 29, 1982;

(4) Letter from Attorney General (of Nebraska), by Assistant Attorney General, to Legal Counsel, (Nebraska) Department of Environmental Control, October 18, 1983.

(e) The Program Description and any other materials submitted as part of the original application or as supplements thereto.

(42 U.S.C. 1422)

[49 FR 24134, June 12, 1984, as amended at 52 FR 17681, May 11, 1987]

§ 147.1402 Aquifer exemptions. [Reserved]

§ 147.1403 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in Nebraska is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program for Indian Lands in Nebraska is June 25, 1984.

[52 FR 17681, May 11, 1987]

Subpart DD—Nevada

§ 147.1450 State-administered program.

The UIC program for all classes of underground injection wells in the State of Nevada, other than those on Indian lands, is the program administered by the Nevada Division of Environmental Protection approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on February 18, 1988; the effective date of this program is October 5, 1988. This program consists of the following elements, as submitted to EPA in the State's program application.

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Nevada. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies may be obtained at the Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, 201 South Fall Street, Carson City, Nevada 89710.

Copies may be inspected at the Environmental Protection Agency, Region IX, 215 Fremont Street, San Francisco, California 99105, or at the Office of the Federal Register, 1100 L Street NW., Washington, DC.

(1) Nevada Revised Statutes [NRS], Volume 25, Chapters 445.131 through 445.354, Inclusive. 1987.

(2) Nevada Revised Statutes [NRS], Volume 29, Chapters 534A.010 through 534A.090, Inclusive. 1987.

(3) Nevada Revised Statutes [NRS], Volume 28, Chapters 522.010 through 522.190, Inclusive. 1987.

(4) Nevada Administrative Code [NAC], Underground Injection Control Regulations, Sections 1 through 96.1, Inclusive. July 22, 1987, revised September 3, 1987 (amending NAC Chapter 445).

(5) Nevada Administrative Code [NAC], Regulations and Rules of Practice and Procedure adopted Pursuant to NRS 534A, Sections 1 through 69, Inclusive. November 12, 1985 (amending NAC Chapter 534A).

(6) Nevada Administrative Code [NAC], Regulations and Rules of Practice and Procedure adopted Pursuant to NRS 522.010 through 522.625, Inclusive. July 22, 1987 (amending NAC Chapter 522).

(b) The Memorandum of Agreement between EPA Region 9 and the Nevada Department of Conservation and Natural Resources signed by the EPA Regional Administrator on April 6, 1988.

(c) *Statement of Legal Authority.* Statement and Amendment to the Statement from the Attorney General of the State of Nevada, signed on July 22, 1987 and November 6, 1987 respectively, by the Deputy Attorney General.

(d) The Program Description and any other materials submitted as part of the original application or as supplements thereto.

[53 FR 39089, Oct. 5, 1988]

§ 147.1451 EPA administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in Nevada is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective Dates.* The effective date of the UIC program for Indian lands in Nevada is June 25, 1984.

[53 FR 43088, Oct. 25, 1988]

§ 147.1452 Aquifer exemptions. [Reserved]

§ 147.1453 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells authorized by rule.

Maximum injection pressure. The owner or operator shall limit injection pressure to the lesser of:

(a) A value which will not exceed the operating requirements of § 144.28(f)(3) (i) or (ii) as applicable; or

(b) A value for well head pressure calculated by using the formula:

$$Pm=(0.733-0.433\ Sg)d$$

where

Pm=injection pressure at the wellhead in pounds per square inch

Sg=specific gravity of injected fluid (unitless)

d=injection depth in feet.

§ 147.1454 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.

(a) *Maximum injection pressure.* (1) To meet the operating requirements of § 144.28(f)(3)(ii) (A) and (B) of this chapter, the owner or operator:

(i) Shall use an injection pressure no greater than the pressure established by the Regional Administrator for the field or formation in which the well is located. The Regional Administrator shall establish such a maximum pressure after notice, opportunity for comment, and opportunity for a public hearing, according to the provisions of Part 124, Subpart A of this chapter, and will inform owners and operators in writing of the applicable maximum pressure; or

(ii) May inject at pressures greater than those specified in paragraph (a)(1)(i) of this section for the field or formation in which he is operating provided he submits a request in writing to the Regional Administrator, and demonstrates to the satisfaction of the Regional Administrator that such injection pressure will not violate the requirement of § 144.28(f)(3)(ii) (A) and (B). The Regional Administrator may grant such a request after notice, opportunity for comment, and opportunity for public hearing, according to the provisions of Part 124, Subpart A of this chapter.

(2) Prior to such time as the Regional Administrator establishes field rules for maximum injection pressure based on data provided pursuant to paragraph (a)(2)(ii) of this section the owner or operator shall:

(i) Limit injection pressure to a value which will not exceed the operating requirements of § 144.28(f)(3)(ii); and

(ii) Submit data acceptable to the Regional Administrator which defines the fracture pressure of the formation in which injection is taking place. A single test may be submitted on behalf of two or more operators conducting operations in the same formation, if the Regional Administrator approves such submission. The data shall be submitted to the Regional Administrator within one year following the effective date of this program.

(b) *Casing and cementing.* Where the Regional Administrator determines that the owner or operator of an existing enhanced recovery or hydrocarbon storage well may not be in compliance with the requirements of §§ 144.28(e) and 146.22, the owner or operator shall comply with paragraphs (b) (1) through (4) of this section, when required by the Regional Administrator:

(1) Protect USDWs by:

(i) Cementing surface casing by recirculating the cement to the surface from a point 50 feet below the lowermost USDW; or

(ii) Isolating all USDWs by placing cement between the outermost casing and the well bore; and

(2) Isolate any injection zones by placing sufficient cement to fill the calculated space between the casing and the well bore to a point 250 feet above the injection zone; and

(3) Use cement:

(i) Of sufficient quantity and quality to withstand the maximum operating pressure;

(ii) Which is resistant to deterioration from formation and injection fluids; and

(iii) In a quantity no less than 120% of the calculated volume necessary to cement off a zone.

(4) The Regional Administrator may specify other requirements in addition to or in lieu of the requirements set forth in paragraphs (b) (1) through (3)

of this section, as needed to protect USDWs.

Subpart EE—New Hampshire

§ 147.1500 State-administered program.

The UIC program for all classes of wells in the State of New Hampshire, except those on Indian lands, is the program administered by the New Hampshire Water Supply and Pollution Control Commission, approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on September 21, 1982 (47 FR 41561); the effective date of this program is October 21, 1982. This program consists of the following elements:

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of New Hampshire. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) New Hampshire Revised Statutes Annotated section 149:8 III(a) (1978);

(2) New Hampshire Code of Administrative Rules, Part Wc 410 (Protection of Groundwaters of the State, sections Ws 410.1 through Ws 410.16) (Issue Ws 3-82).

(b)(1) The Memorandum of Agreement between EPA Region I and the New Hampshire Water Supply and Pollution Control Commission, signed by the EPA Regional Administrator on August 23, 1982;

(2) Amendment No. 1 to the Memorandum of Agreement, signed by the EPA Regional Administrator on July 16, 1982.

(c) *Statement of legal authority.* (1) Letter from Attorney General of New Hampshire to Regional Administrator, EPA Region I, "Re: Attorney General's Statement—Underground Injection Control Program," March 23, 1982;

(2) Letter from Attorney General of New Hampshire to Regional Administrator, EPA Region I, "Re: Attorney General's Statement—Underground Injection Control Program," July 1, 1982.

(d) The Program Description and any other materials submitted as part of the application or as supplements thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43088, Oct. 25, 1988]

§ 147.1501 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in New Hampshire is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program for Indian lands in New Hampshire is November 25, 1988.

[53 FR 43088, Oct. 25, 1988]

Subpart FF—New Jersey

§ 147.1550 State-administered program.

The UIC program for all classes of wells in the State of New Jersey, except those on Indian lands, is the program administered by the New Jersey Department of Environmental Protection, approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on July 15, 1983 (48 FR 32343); the effective date of this program is August 15, 1983. This program consists of the following elements, as submitted to EPA in the State's program application.

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of New Jersey. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) Water Pollution Control Act, New Jersey Statutes Annotated sections 58:10A-1 through 58:10A-14 (1982);

(2) Regulations Concerning the New Jersey Pollutant Discharge Elimination System, New Jersey Administrative Code sections 7:14A-1.1 through -1.10 (subchapter 1), 7:14A-2.1 through 2.15 (subchapter 2), 7:14A-5.1 through -5.18 (subchapter 5), and 7:14A-10.13 (as published by the State of New Jersey Department of Environmental Protection, March 1981).

(b)(1) The Memorandum Agreement between EPA Region II and the New Jersey Department of Environmental Protection, signed by the EPA Regional Administrator on September 9, 1982;

(2) Letter from Commissioner, New Jersey Department of Environmental Protection, to Regional Administrator, EPA Region II, March 21, 1983.

(c) *Statement of legal authority.* (1) Letter from Attorney General of New Jersey (by Deputy Attorney General) to Commissioner, Department of Environmental Protection, "Re: New Jersey Pollutant Discharge Elimination System—Underground Injection Control," February 9, 1982;

(2) Letter from Attorney General of New Jersey (by Deputy Attorney General) to Commissioner, Department of Environmental Protection, "Re: New Jersey Pollutant Discharge Elimination System—Underground Injection Control," April 15, 1983 (six pages);

(3) Letter from Attorney General of New Jersey (by Assistant Attorney General) to Commissioner, Department of Environmental Protection, "Re: New Jersey Pollutant Discharge Elimination System—Underground Injection Control," April 15, 1983 (two pages).

(d) The Program Description and any other materials submitted as part of the application or as supplements thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43089, Oct. 25, 1988]

§ 147.1551 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in New Jersey is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program for Indian lands in New Jersey is November 25, 1988.

[53 FR 43089, Oct. 25, 1988]

Subpart GG—New Mexico

§ 147.1600 State-administered program—Class II wells.

The UIC program for Class II wells in the State of New Mexico, except for those on Indian lands, is the program administered by the New Mexico Energy and Minerals Department, Oil Conservation Division, approved by EPA pursuant to section 1425 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on February 5, 1982 (47 FR 5412); the effective date of this program is March 7, 1982. This program consists of the following elements as submitted to EPA in the State's program application:

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of New Mexico. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) Oil and Gas Act, New Mexico Statutes Annotated sections 70-2-1 through -36 (1978);

(2) *State of New Mexico Energy an Mineral Department, Oil Conservatio Division—Rules and Regulation* (dated 10-1-78), sections B-3, I-70 through I-708, M-1100 through M 1121.

(b)(1) The Memorandum of Agree ment between EPA Region VI and th New Mexico Energy and Minerals De partment, Oil Conservation Divisio signed by the EPA Regional Adminis trator on December 10, 1981;

(2) Addendum No. 1 to the Mem randum of Agreement, signed by th EPA Regional Administrator on Jun 28, 1982;

(3) Addendum No. 2 to the Mem randum of Agreement, signed by th

EPA Regional Administrator on November 18, 1982;

(4) Letter from Director, Oil Conservation Division, New Mexico Energy and Minerals Department, and Assistant Attorney General of New Mexico, to Regional Administrator, EPA Region VI, November 6, 1981.

(c) *Statement of legal authority.* "Statement of Legal Authority of the State of New Mexico by and through its Oil Conservation Division of the Energy and Mines Department to conduct an Underground Injection Control Program," signed by Assistant Attorney General and General Counsel to the Oil Conservation Division.

(d) The Program Description and any other materials submitted as part of the application or as supplements thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43089, Oct. 25, 1988]

§ 147.1601 State-administered program—Class I, III, IV and V wells.

The UIC program for Class I, III, IV and V injection wells in the State of New Mexico, except for those on Indian lands, is the program administered by the New Mexico Water Quality Control Commission, the Environmental Improvement Division, and the Oil Conservation Division, approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on July 11, 1983 (48 FR 31640); the effective date of this program is August 10, 1983. This program consists of the following elements, as submitted to EPA in the State's program application:

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of New Mexico. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) New Mexico Water Quality Control Commission Regulations (WQCC 82-1) sections 1-100 through 5-300 (September 20, 1982).

(b) *Other laws.* The following statutes and regulations, although not incorporated by reference, are also part of the approved State-administered UIC program:

(1) Water Quality Act, New Mexico Statutes Annotated sections 74-6-1 through 74-6-13 (1978 and Supp. 1982);

(2) Geothermal Resources Conservation Act, New Mexico Statutes Annotated sections 71-5-1 through 71-5-24 (1978 and Supp. 1982);

(3) Surface Mining Act, New Mexico Statutes Annotated sections 69-25A-1 through 69-25A-35 (1978 and Supp. 1980).

(c)(1) The Memorandum of Agreement between EPA Region VI and the New Mexico Water Quality Control Commission, the Environmental Improvement Division, and the Oil Conservation Division, signed by the EPA Regional Administrator on April 13, 1983;

(2) Letter from the Director, Environmental Improvement Division and the Director, Oil Conservation Division, to Regional Administrator, EPA Region IV, "Re: New Mexico Underground Injection Control Program—Clarification," February 10, 1983.

(d) *Statement of legal authority.* "Attorney General's Statement," signed by the Assistant Attorney General for the Environmental Improvement Division, the Assistant Attorney General for Oil Conservation Division, and the Deputy Attorney General, Civil Division, Counsel for the Mining and Minerals Division, undated, submitted December 8, 1982.

(e) The Program Description and any other materials submitted as part of the application or as supplements thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43089, Oct. 25, 1988]

§ 147.1603 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in New Mexico is administered by EPA. The program consists of the requirements set forth at Subpart HHH of this part. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date for the UIC program on Indian lands in New Mexico is November 25, 1988.

[53 FR 43089, Oct. 25, 1988]

Subpart HH—New York

§ 147.1650 State-administered program. [Reserved]

§ 147.1651 EPA-administered program.

(a) *Contents.* The UIC program for the State of New York, including all Indian lands, is administered by EPA. The program consists of the UIC program requirements in 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective dates.* The effective date of the UIC program for New York for all injection activities except those on lands of the Seneca Indian Tribe is June 25, 1984. The effective date for the UIC program for the lands of the Seneca Indian Tribe is November 25, 1988.

[53 FR 43089, Oct. 25, 1988; 54 FR 10616, Mar. 14, 1989]

§ 147.1652 Aquifer exemptions.

(a) This section identifies any aquifer or their portions exempted in accordance with §§ 144.7(b) and 146.4 of this chapter at the time of program promulgation. EPA may in the future exempt other aquifers or portions, according to applicable procedures, without codifying such exemptions in this section. An updated list of exemptions will be maintained in the Regional office.

(b) The following portions of aquifers are exempted in accordance with the provisions of § 144.7(b) and § 146.4 of this chapter for Class II injection activities only:

(1) The Bradford First, Second, and Third Sand Members and the Kane Sand Member in the Bradford Field in Cattaraugus County.

(2) The Chipmunk Oil field in Cattaraugus County.

§ 147.1653 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells authorized by rule.

Maximum injection pressure. The owner or operator shall limit injection pressure to the lesser of:

(a) A value which will not exceed the operating requirements of § 144.28(f)(3) (i) or (ii) as applicable; or

(b) A value for well head pressure calculated by using the following formula:

$$Pm = (0.733 - 0.433\ Sg)d$$

where

Pm = injection pressure at the well head in pounds per square inch

Sg = specific gravity of inject fluid (unitless)

d = injection depth in feet.

§ 147.1654 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.

(a) *Maximum injection pressure.* (1) To meet the operating requirements of § 144.28(f)(3)(ii) (A) and (B) of this chapter, the owner or operator:

(i) Shall use an injection pressure no greater than the pressure established by the Regional Administrator for the field or formation in which the well is located. The Regional Administrator shall establish such a maximum pressure after notice, opportunity for comment, and opportunity for a public hearing, according to the provisions of Part 124, Subpart A of this chapter, and will inform owners and operators in writing of the applicable maximum pressure, or

(ii) May inject at pressures greater than those specified in paragraph (a)(1)(i) of this section for the field or formation in which he is operating provided he submits a request in writing to the Regional Administrator, and demonstrates to the satisfaction of the Regional Administrator that such injection pressure will not violate the requirement of § 144.28(f)(3)(ii) (A) and (B). The Regional Administrator may grant such a request after notice, opportunity for comment, and opportunity for a public hearing, according to the provisions of Part 124, Subpart A of this chapter.

(2) Prior to such time as the Regional Administrator establishes rules for maximum injection pressure based on

data provided pursuant to paragraph (a)(2)(ii) of this section the owner or operator shall:

(i) Limit injection pressure to a value which will not exceed the operating requirements of § 144.28(f)(3)(ii); and

(ii) Submit data acceptable to the Regional Administrator which defines the fracture pressure of the formation in which injection is taking place. A single test may be submitted on behalf of two or more operators conducting operations in the same formation, if the Regional Administrator approves such submission. The data shall be submitted to the Regional Administrator within one year of the effective date of this program.

(b) *Casing and cementing.* Where the Regional Administrator determines that the owner or operator of an existing enhanced recovery or hydrocarbon storage well may not be in compliance with the requirements of §§ 144.28(e) and 146.22, the owner or operator shall comply with paragraphs (b) (1) through (4) of this section, when required by the Regional Administrator:

(1) Protect USDWs by:

(i) Cementing surface casing by recirculating the cement to the surface from a point 50 feet below the lowermost USDW; or

(ii) Isolating all USDWs by placing cement between the outermost casing and the well bore; and

(iii) For wells as described in § 146.8(b)(3)(ii), installing a smaller diameter pipe inside the existing injection tubing and setting it on an appropriate packer; and

(2) Isolate any injection zones by placing sufficient cement to fill the calculated space between the casing and the well bore to a point 50 feet above the injection zone; and

(3) Use cement:

(i) Of sufficient quantity and quality to withstand the maximum operating pressure;

(ii) Which is resistant to deterioration from formation and injection fluids; and

(iii) In a quantity no less than 120% of the calculated volume necessary to cement off a zone.

(4) The Regional Administrator may specify other requirements in addition to or in lieu of the requirements set forth in paragraphs (b) (1) through (3) of this section as needed to protect USDWs.

§ 147.1655 Requirements for wells authorized by permit.

(a) The owner or operator of a Class I well authorized by permit shall install or shall ensure that the well has:

(1) Surface casing present;

(i) Extending from the surface to a depth at least 50 feet below the base of the lowermost USDW; and

(ii) Cemented back to the surface by recirculating the cement; and

(2) Long string casing and tubing;

(i) Extending to the injection zone; and

(ii) Cemented back to 50 feet above the base of the next largest casing string.

(b) The owner or operator of a new Class II well authorized by permit shall:

(1) Install surface casing from the surface to at least 50 feet below the base of the lowermost USDW.

(2) Cement the casing by recirculating to the surface or by using no less than 120% of the calculated annular volume.

(3) For new enhanced recovery wells, install tubing or long string casing extending to the injection zone.

(4) For new salt water disposal wells, install long string casing and tubing extending to the injection zone.

(5) Isolate any injection zone by placing sufficient cement to fill the calculated volume to a point 50 feet above the injection zone.

(c) The Regional Administrator may specify casing and cementing requirements other than those listed in paragraphs (a) and (b) of this section on a case by case basis as conditions of the permit.

Subpart II—North Carolina

§§ 147.1700—147.1702 [Reserved]

§ 147.1703 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in North Carolina is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program for Indian lands in North Carolina is November 25, 1988.

[53 FR 43089, Oct. 25, 1988]

§§ 147.04—147.1749 [Reserved]

Subpart JJ—North Dakota

§ 147.1750 State-administered program—Class II wells.

The UIC program for Class II wells in the State of North Dakota, except those on Indian lands, is the program administered by the North Dakota Industrial Commission, approved by EPA pursuant to section 1425 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on August 23, 1983 (48 FR 38237); the effective date of this program is September 24, 1983. This program consists of the following elements, as submitted to EPA in the State's program application.

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of North Dakota. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) North Dakota Century Code sections 38-08-05 (Supp. 1983);

(2) North Dakota Administrative Code, Chapter 43-02-05 (Underground Injection Control, sections 43-02-05-01 through -14 as published in *Statutes and Rules for the Conservation of Oil and Gas,* North Dakota Industrial Commission, January 1, 1983);

(b) The Memorandum of Agreement between EPA Region VIII and the North Dakota Industrial Commission, Oil and Gas Division, signed by the EPA Regional Administrator on June 16, 1983.

(c) *Statement of legal authority.* "Underground Injection Control Program Attorney General's Statement," as submitted with the North Dakota Underground Injection Control Program Primacy Application for Class II Injection Wells, transmitted by the Governor on July 15, 1982 (16 pages).

(d) The Program Description and other materials submitted as part of the application or as supplements thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43089, Oct. 25, 1988]

§ 147.1751 State-administered program—Class I, III, IV and V wells.

The UIC program for Class I, III, IV, and V wells in the State of North Dakota, except those on Indian lands, is the program administered by the North Dakota Department of Health, approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on September 21, 1984; the effective date of this program is October 5, 1984. This program consists of the following elements, as submitted to EPA in the State's program application.

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of North Dakota. This incorporation by reference was approved by the Director of the Federal Register effective October 5, 1984.

(1) North Dakota Century Code Sections 38-12-01, 38-12-03 (1980);

(2) North Dakota Century Code Sections 61-28-02, 61-28-06 (Supp. 1981);

(3) North Dakota Administrative Code Sections 33-25-01-01 through 33-25-01-18 (North Dakota State Health Department Underground Control Program) (1983);

(4) North Dakota Administrative Code Sections 43-02-02-01, 43-02-02-12, 43-02-02-16 through 43-02-02-26, 43-02-02-29, 43-02-02-31, 43-02-02-35 (North Dakota Geological Survey Subsurface Mineral Exploration and Development) (1978);

(5) North Dakota Administrative Code Sections 43-02-02-1-01 through 43-02-02-1-18 (North Dakota Geological Survey—Undergound Injection Control Program) (1984);

(b) *Other laws.* The following statutes and regulations, although not incorporated by reference, also are part of the approved State-administered program;

(1) North Dakota Environmental Law Enforcement Act of 1975, North Dakota Century Code Sections 32-40-01 to 32-40-11 (1976);

(2) North Dakota Century Code, Ch. 38-12 (Regulation, Development, and Production of Subsurface Minerals) (1979);

(3) North Dakota Century Code Ch. 61-28 (Control, Prevention, and Abatement of Pollution of Surface Waters) (1981);

(4) North Dakota Administrative Code Article 33-22 (Practice and Procedure) (1983).

(c) The Memorandum of Agreement between EPA Region VIII and the North Dakota Department of Health, signed by the EPA Regional Administrator on May 18, 1984.

(d) The Program Description and any other materials submitted as part of the original application or as supplements thereto.

[49 FR 37066, Sept. 21, 1984]

§ 147.1752 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in North Dakota is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program for Indian lands in North Dakota is November 25, 1988.

[53 FR 43089, Oct. 25, 1988]

Subpart KK—Ohio

§ 147.1800 State-administered program—Class II wells.

The UIC program for Class II wells in the State of Ohio, except for those on Indian lands, is the program administered by the Ohio Department of Natural Resources, approved by EPA pursuant to section 1425 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on August 23, 1983 (48 FR 38238); the effective date of this program is September 22, 1983. This program consists of the following elements, as submitted to EPA in the State's program application:

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Ohio. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) Ohio Revised Code Annotated, sections 1509.01 through 1509.22 (Page 1978 and Supp. 1982);

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 371.17, see the List of CFR Sections Affected in the Finding Aids section of this volume.

(2) Rules of the Division of Oil and Gas, Ohio Administrative Code sections 1501:91-01, through 1501: 9-11-13 (1983).

(b) The Memorandum of Agreement between EPA Region V and the Ohio Department of Natural Resources.

(c) *Statement of legal authority.* "Underground Injection Control Program—Attorney General's Statement," signed by the Assistant Attorney General, Chief, Environmental Law Section, for the Attorney General of Ohio, September 30, 1982.

(d) The Program Description and any other materials submitted as part of the application or as supplements thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43089, Oct. 25, 1988]

§ 147.1801 State-administered program—Class I, III, IV and V wells.

The UIC program for Class I, III, IV, and V wells in the State of Ohio, other than those on Indian lands, is the program administered by the Ohio Department of Natural Resources and the Ohio Environmental Protection Agency, approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on November 29, 1984; the effective date of this program is January 14, 1985. This program consists of the following elements, as submitted to EPA in the State's program application.

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Ohio. This incorporation by reference was approved by the Director of the FEDERAL REGISTER effective January 14, 1985.

(1) Ohio Revised Code Annotated, sections 1509.01, 1509.03, 1509.221 (Supp. 1983);

(2) Rules of the Division of Oil and Gas, Ohio Administrative Code, sections 1501:9-7-01 through 7-14 (1984);

(3) Ohio Revised Code Annotated, sections 6111.04, 6111.043, 6111.044 (Supp. 1983);

(4) Rules of the Ohio Environmental Protection Agency, Ohio Administrative Code, sections 3745-34-01 through 34-41; 3745-9-01 through 9-11 (Director Ohio EPA Order, June 18, 1984).

(b) *Other laws.* The following statutes and regulations, although not incorporated by reference, also are part of the approved State-administered program:

(1) Ohio Revised Code, Chapter 119 (1978 Replacement Part);

(2) Ohio Code Supplement, sections 6111.041, 6111.042, 6111.045 (Supp. 1982).

(c) (1) The Memorandum of Agreement between EPA Region V and the Ohio Department of Natural Resources, signed by the EPA Regional Administrator on March 30, 1984;

(2) Memorandum of Agreement between the Ohio Department of Natural Resources and the Ohio Environmental Protection Agency, Related to the Underground Injection Control Program for the State of Ohio, signed August 1, 1984.

(d) *Statement of legal authority.* Statement from Attorney General of the State of Ohio, by Senior Assistant Attorney General, "Underground Injection Control Program—Attorney General's Statement," July 25, 1984.

(e) The Program Description and any other materials submitted as part of the original application or as supplements thereto.

[49 FR 46897, Nov. 29, 1984]

§ 147.1802 Aquifer exemptions. [Reserved]

§ 147.1803 Existing Class I and III wells authorized by rule—maximum injection pressure.

The owner or operator shall limit injection pressure to the lesser of:

(a) A value which will not exceed the operating requirements of § 144.28(f)(3)(i); or

(b) A value for well head pressure calculated by using the following formula:

$$Pm = (0.8 - 0.433\ Sg)\ d$$

where

Pm = injection pressure at the well head in pounds per square inch

Sg = specific gravity of injected fluid (unitless)

d = injection depth in feet.

[49 FR 45308, Nov. 15, 1984]

§ 147.1805 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in Ohio is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program for Indian lands in Ohio is November 25, 1988.

[53 FR 43089, Oct. 25, 1988]

Subpart LL—Oklahoma

§ 147.1850 State-administered program—Class I, III, IV and V wells.

The UIC program for Class I, III, IV, and V wells in the State of Oklahoma, except those on Indian lands, is the program administered by the Oklahoma State Department of Health, approved by EPA pursuant to SDWA section 1422. Notice of this approval was published in the FEDERAL REGISTER on June 24, 1982 (47 FR 27273). The effective date of this program is July 24, 1982. This program consists of the following elements, as submitted to EPA in the State's program application:

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Oklahoma. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) Oklahoma Statutes title 63 sections 1-901, 1-903 (1981);

(2) Oklahoma Controlled Industrial Waste Disposal Act, Oklahoma Statute Annotated title 63 sections 1-2002, 1-2014 (West Supp. 1983-1984);

(3) *Regulations.* [Reserved]

(b) *Other laws.* The following statutes and regulations, although not incorporated by reference except for select sections identified in paragraph (a) of this section, are also part of the approved State-administered UIC program:

(1) Oklahoma Open Meeting Act, Oklahoma Statutes title 25 sections 301 through 314 (Supp. 1978);

(2) Oklahoma Statutes Annotated title 63 sections 1-101 to 1-114, 1-901 to 1-911, 1-1601 *et seq.*, 1-1701, 1-2001 to 1-2014 (West 1973 and Supp. 1982);

(3) Oklahoma Statutes Annotated title 75 sections 301 to 327 (West 1976 and Supp. 1982).

(c) (1) The Memorandum of Agreement between EPA Region VI and the Oklahoma State Department of Health, signed by the EPA Regional Administrator on April 13, 1982;

(2) Memorandum of Understanding between the Oklahoma State Department of Health and the Oklahoma Corporation Commission (OCC), signed by members of the OCC on February 12, 1982;

(3) Memorandum of Understanding between the Oklahoma State Department of Health and the Oklahoma Department of Mines (ODM), signed by the Deputy Chief Mine Inspector, ODM, on February 15, 1982.

(d) *Statement of legal authority.* Letter from Attorney General of Oklahoma to Commissioner of Health, Oklahoma State Department of Health, "Re: Statement and Memorandum of Law Concerning the Authority for the Oklahoma State Department of Health's Underground Injection Control Program," February 12, 1982.

(e) The Program Description and any other materials submitted as part of the application or as supplements thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43090, Oct. 25, 1988]

§ 147.1851 State-administered program—Class II wells.

The UIC program for Class II wells in the State of Oklahoma, including the lands of the Five Civilized Tribes, but not including those on other Indian lands, is the program administered by the Oklahoma Corporation Commission approved by EPA pursuant to SDWA section 1425. Notice of this approval was published in the FEDERAL REGISTER on December 2, 1981 (46 FR 58588). This program consists of the following elements, as submitted to EPA in the State's program application:

(a) *Incorporation by reference.* [Reserved]

(b) *Other laws.* The following statutes and regulations, although not incorporated by reference, are also part of the approved State-administered UIC program:

(1) Oklahoma Statutes, title 17 sections 51-53; title 52 sections 86.1-86.5, 139-153, 243, 307-318.1 (1971).

(2) OCC-OGR Rules No. 1-101-3-303.

(c) (1) The Memorandum of Agreement between EPA Region VI and the Oklahoma Corporation Commission, signed by the EPA Regional Administrator on April 13, 1981;

(2) Letter from the Manager, Underground Injection Control, Oklahoma Corporation Commission, to EPA, June 18, 1981.

(d) *Statement of legal authority.* "Statement of Legal Authority of the Oklahoma Corporation Commission to Conduct an Underground Injection Control Program," (Part IV, pages 30-41 of "State of Oklahoma Primacy Application for Authority to Regulate Class II Injection Wells," submitted April 14, 1981), signed by the Conservation Attorney, Counsel to the Director and the Oklahoma Corporation Commission.

(e) The Program Description and any other materials submitted as part of the application or as supplements thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43090, Oct. 25, 1988]

§ 147.1852 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all wells on Indian lands in Oklahoma, except Class II wells on the lands of the Five Civilized Tribes, is administered by EPA. The UIC program for Class II wells on the Osage Mineral Reserve consists of the requirements set forth in Subpart GGG of this part. The UIC program for all other wells on Indian lands consists of the requirements set forth in Subpart III of this part. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date for UIC program for Class II wells on the Osage Mineral Reserve is December 30, 1984. The effective date for the UIC program for all other wells on Indian lands is November 25, 1988.

[53 FR 43090, Oct. 25, 1988]

Subpart MM—Oregon

§ 147.1900 State-administered program.

The UIC program for all classes of wells in Oregon, except those on Indian lands, is administered by the Oregon Department of Environmental Quality, approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on September 25, 1984; the effective date of this program is October 9, 1984. This program consists of the following elements, as submitted to EPA in the State's program application.

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Oregon. This incorporation by reference was approved by the Director of the FEDERAL REGISTER effective October 9, 1984.

(1) Oregon Revised Statutes, Title 16, chapter 164, section 164.785; Title 36, chapter 468, sections 468.005, 468.065 to 468.070, 468.700 to 468.815; Title 43, chapter 520 sections 520.005, 520.095, 520.155—520.330 (1983);

(2) Oregon Administrative Rules, 340 Division 44 sections 340-44-005 to 340-44-055 October 1983, 340-45-005 to 340-45-070 (June 1980); Chapter 632 sections 632-10-002 to 632-10-235 (Dated October 1982); 632-20-005 to 632-20-159; 632-20-170 to 632-20-180 (January 1981).

(b) *Other laws.* The following statutes and regulations, although not incorporated by reference, also are part of the approved State-administered program:

(1) Oregon Revised Statutes, Chapter 183; 192.420, 192.500, 459.460(3), 468.005-468.605, 468.780-468.997; Chapters 516, 522 (1983);

(2) Oregon Administrative Rules, chapter 137, Div. 3 (July 1982); chapter 340, Div. 11 (November, 1983); chapter 340, Div. 14 (November, 1983); chapter 340, Div. 52 (November 1983); chapter 632, Div. 1 (June 1980); Ch. 632, Div. 20 (January 1981);

(c)(1) The Memorandum of Agreement between EPA Region X and the Oregon Department of Environmental Quality, signed by the EPA Regional Administrator on May 3, 1984.

(d) *Statement of legal authority.* (1) "Underground Injection Control Program Legal Counsel's Statement," October 1983, signed by the Assistant Attorney General, Oregon;

(2) Opinion of the Attorney General, Oregon, 35 Op. Attorney General 1042 (1972).

(e) The Program Description and any other materials submitted as part of the original application or as supplements thereto.

[49 FR 37594, Sept. 25, 1984, as amended at 53 FR 43090, Oct. 25, 1988]

§ 147.1901 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in Oregon is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program for Indian lands in Oregon is November 25, 1988.

[53 FR 43090, Oct. 25, 1988]

Subpart NN—Pennsylvania

§ 147.1950 State-administered program. [Reserved]

§ 147.1951 EPA-administered program.

(a) *Contents.* The UIC program for the State of Pennsylvania, including all Indian lands, is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and the additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective dates.* The effective date for the UIC program on Indian lands is November 25, 1988. The effective date for the UIC program for the rest of Pennsylvania is June 25, 1984.

[53 FR 43090, Oct. 25, 1988]

§ 147.1952 Aquifer exemptions.

(a) This section identifies any aquifers or their portions exempted in accordance with §§ 144.7(b) and 146.4 of this chapter at the time of program promulgation. EPA may in the future exempt other aquifers or portions, according to applicable procedures, without codifying such exemptions in this section. An updated list of exemptions will be maintained in the Regional office.

(b) Those portions of the following oil bearing aquifers, which would otherwise meet the definition of a USDW, are exempted in accordance with the provisions of §§ 144.7(b) and 146.4 of this chapter for Class II enhanced recovery injection activities only.

(1) The Sugar Run and Bradford series of oil producing sands of the Bradford Field, in McKean County; including the Bradford, West Branch, Stack, Bennett Brook, Marilla Brook, Brooder Hollow, Cyclone, Minard Run, Minard Run School, and Sugar Run (or Watsonville) Pools.

(2) The Bradford Third oil producing sand of the Guffey Field in McKean County.

(3) The Bradford series of oil producing sands of the Lewis Run Field in McKean County.

(4) The Bradford series of oil producing sands of the Windfall Field and Kings Run Pool in McKean County.

(5) The Red Valley member of the Second Sand formation of the Venango Group of oil producing sands in the Foster-Reno Field in Venango County; including the Foster, Bully Hill, Victory, Bredinsburg, Egypt Corners, Reno, Monarch Park and Seneca Pools.

(6) The Glade and Clarendon oil producing sands of the Morrison Run Field and Elk Run Pool in Warren County.

(7) The Clarendon and Glade oil producing sands of the Clarendon Field in Warren County.

(8) The Bradford Third oil producing sand in the Shinglehouse Field, including the Kings Run, Janders Run and Ceres Pools in Potter and McKean Counties.

§ 147.1953 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells authorized by rule.

Maximum injection pressure. The owner or operator shall limit injection pressure to the lesser of:

(a) A value which will not exceed the operating requirements of § 144.28(f)(3) (i) or (ii) as applicable or

(b) A value for well head pressure calculated by using the following formula:

Pm=(0.733—0.433 Sg)d

where

Pm=injection pressure at the well head in pounds per square inch

Sg=specific gravity of injection fluid (unitless)

d=injection depth in feet.

§ 147.1954 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.

(a) *Maximum injection pressure.* (1) To meet the operating requirements of § 144.28(f)(3)(ii) (A) and (B) of this chapter, the owner or operator:

(i) Shall use an injection pressure no greater than the pressure established by the Regional Administrator for the field or formation in which the well is located. The Regional Administrator shall establish such a maximum pressure after notice, opportunity for comment, and opportunity for a public hearing, according to the provisions of Part 124, Subpart A of this chapter, and will inform owners and operators in writing of the applicable maximum pressure; or

(ii) May inject at pressures greater than those specified in paragraph (a)(1)(i) of this section for the field or formation in which he is operating provided he submits a request in writing to the Regional Administrator, and demonstrates to the satisfaction of the Regional Administrator that such injection pressure will not violate the requirement of § 144.28(f)(3)(ii) (A) and (B). The Regional Administrator may grant such a request after notice, opportunity for comment, and opportunity for a public hearing, according to the provisions of Part 124, Subpart A of this chapter.

(2) Prior to such time as the Regional Administrator establishes rules for maximum injection pressure based on data provided pursuant to paragraph (a)(2)(ii) of this section the owner or operator shall:

(i) Limit injection pressure to a value which will not exceed the operating requirements of § 144.28(f)(3)(ii); and

(ii) Submit data acceptable to the Regional Administrator which defines the fracture pressure of the formation in which injection is taking place. A single test may be submitted on behalf of two or more operators conducting operations in the same formation, if the Regional Administrator approves such submission. The information shall be submitted to the Regional Administrator within one year of the effective date of this regulation.

(b) *Casing and cementing.* Where the Regional Administrator determines that the owner or operator of an existing enhanced recovery or hydrocarbon storage well may not be in compliance with the requirements of §§ 144.28(e) and 146.22, the owner or operator shall comply with paragraphs (b) (1) through (4) of this section, when required by the Regional Administrator:

(1) Protect USDWs by:

(i) Cementing surface casing by recirculating the cement to the surface from a point 50 feet below the lowermost USDW; or

(ii) Isolating all USDWs by placing cement between the outermost casing and the well bore; and

(iii) For wells as described i
§ 146.8(b)(3)(ii), installing a smaller di
ameter pipe inside the existing injec
tion tubing and setting it on an appro
priate packer; and

(2) Isolate any injection zones b
placing sufficient cement to fill th
calculated space between the casin
and the well bore to a point 50 fee
above the injection zone; and

(3) Use cement:

(i) Of sufficient quantity and qualit
to withstand the maximum operatin
pressure;

(ii) Which is resistant to deterior
tion from formation and injectio
fluids; and

(iii) In a quantity no less than 120
of the calculated volume necessary
cement off a zone.

(4) The Regional Administrator ma
specify other requirements in additio
to or in lieu of the requirements s
forth in paragraphs (b) (1) through (
of this section as needed to prote
USDWs.

§ 147.1955 Requirements for wells authorized by permit.

(a) The owner or operator of a Class I well authorized by permit shall install or shall ensure that the well has:

(1) Surface casing present;

(i) Extending from the surface to a depth at least 50 feet below the base of the lowermost USDW; and

(ii) Cemented back to the surface by recirculating the cement; and

(2) Long string casing and tubing;

(i) Extending to the injection zone; and

(ii) Cemented back to 50 feet above the base of the next largest casing string.

(b) The owner or operator of a new Class II well authorized by permit shall:

(1) Install surface casing from the surface to at least 50 feet below the base of the lowermost USDW.

(2) Cement the casing by recirculating to the surface or by using no less than 120% of the calculated annular volume.

(3) For new enhanced recovery wells, install tubing or long string casing extending to the injection zone.

(4) For new salt water disposal wells, install long string casing and tubing extending to the injection zone.

(5) Isolate any injection zone by placing sufficient cement to fill the calculated volume to a point 50 feet above the injection zone.

(c) The Regional Administrator may specify casing and cementing requirements other than those listed in paragraphs (a) and (b) of this section on a case by case basis as conditions of the prmit.

Subpart OO—Rhode Island

§ 147.2000 State-administered program—Class I, II, III, IV, and V wells.

The UIC program for all classes of wells in Rhode Island, except those on Indian lands, is the program administered by the Rhode Island Department of Environmental Management, approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on August 1, 1984; the effective date of this program is August 15, 1984. This program consists of the following elements, as submitted to EPA in the State's program application.

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Rhode Island. This incorporation by reference was approved by the Director of the Federal Register effective August 15, 1984.

(1) Rhode Island Gen. Laws sections 46-12-1, 46-12-5, and 46-12-28 (Supp. 1983);

(2) "Underground Injection Control Program Rules and Regulations." State of Rhode Island and Providence Plantations Department of Environmental Management. Division of Water Resources (as received by the Secretary of State, May 21, 1984).

(b) *Other laws.* The following statutes and regulations although not incorporated by reference, also are part of the approved State-administered program:

(1) Rhode Island General Laws, Section 10-20-1 *et seq.*, entitled "State Environmental Rights";

(2) Rhode Island General Laws, Section 23-19.1-1 *et seq.*, entitled "Hazardous Waste Management";

(3) Rhode Island General Laws, Section 42-17.1 *et seq.*, entitled "Department of Environmental Management";

(4) Rhode Island General Laws, Section 42-35-1 *et seq.*, entitled "Administrative Procedures";

(5) Rhode Island General Laws, Section 46-12-1 *et seq.*, entitled "Water Pollution";

(6) Hazardous Waste Management Facility Operating Permit Rules and Regulations—Landfills, at last amended November 2, 1981 (hereinafter referred to as the "Hazardous Waste Regulation");

(7) Water Quality Regulations for Water Pollution Control, effective November 19, 1981; and

(8) Administrative Rules of Practices and Procedure for Department of Environmental Management, effective November 12, 1980.

(c) (1) The Memorandum of Agreement between EPA Region I and the Rhode Island Department of Environmental Management, signed by the

EPA Regional Administrator on March 29, 1984;

(2) Letter from Director, Rhode Island Department of Environmental Management, to Regional Administrator, EPA Region I, amending Section III, C of the Memorandum of Agreement, April 25, 1984.

(d) *Statement of legal authority.* Letter from Attorney General, State of Rhode Island and Providence Plantations, to Regional Administrator, EPA Region 1, "Re: Attorney General's Statement, Underground Injection Control Program," January 17, 1984.

(e) The Program Description and any other materials submitted as part of the original application or as supplements thereto.

[49 FR 30699, Aug. 1, 1984, as amended at 53 FR 43090, Oct. 25, 1988]

§ 147.2001 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in Rhode Island is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program for Indian lands in Rhode Island is November 25, 1988.

[53 FR 43090, Oct. 25, 1988]

Subpart PP—South Carolina

§ 147.2050 State-administered program.

The UIC program for all classes of wells in the State of South Carolina, except for those on Indian lands, is the program administered by the South Carolina Department of Health and Environmental Control, approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on July 10, 1984; the effective date of this program is July 24, 1984. This program consists of the following elements, as submitted to EPA in the State's program application.

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of South Carolina. This incorporation by reference was approved by the Director of the Federal Register effective July 24, 1984.

(1) Pollution Control Act, S.C. Code Ann. Sections 48-1-10, 48-1-90, 48-1-100, 48-1-110 (Law. Co-op. 1976 and Supp. 1983).

(2) South Carolina Department of Health and Environmental Control, Ground-Water Protection Division, Underground Injection Control Regulations, R-61-87, Effective Date: June 24, 1983 Published in South Carolina State Register, Volume 7, Issue 6; Amended Date: March 23, 1984, as amended by notice in South Carolina State Register, Volume 8, Issue 3.

(b) *Other laws.* The following statutes and regulations although not incorporated by reference, also are part of the approved State-Administered program:

(1) Pollution Control Act, S.C. Code Ann. Sections 48-1-10 to 48-1-350 (Law. Co-op. 1976 and Supp. 1983).

(2) State Safe Drinking Water Act, S.C. Code Ann. Sections 44-55-10 to 44-55-100 (Law. Co-op. 1976 and Supp. 1983).

(3) Administrative Procedures Act, S.C. Code Ann. Sections 1-23-10 et seq., and 1-23-310 to 1-23-400 (Law. Co-op. 1976 and Supp. 1983).

(4) S.C. Code Ann. Sections 15-5-20, 15-5-200 (Law. Co-op. 1976 and Supp. 1983).

(c)(1) The Memorandum of Agreement between EPA Region IV and the South Carolina Department of Health and Environmental Control signed by the EPA Regional Administrator on May 29, 1984.

(d) *Statement of legal authority.* (1) "Underground Injection Control Program, Attorney General's Statement for Class I, II, III, IV and VA and VB Wells," signed by the Attorney General of South Carolina on April 27, 1984.

(e) The Program Description and any other materials submitted as part of the original application or as supplements thereto.

[49 FR 28058, July 10, 1984, as amended at 53 FR 43090, Oct. 25, 1988]

§ 147.2051 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in South Carolina is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146, and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program for Indian lands in South Carolina is November 25, 1988.

[53 FR 43090, Oct. 25, 1988]

Subpart QQ—South Dakota

§ 147.2100 State-administered program—Class II wells.

The UIC program for Class II wells in the State of South Dakota, except those on Indian lands, is the program administered by the South Dakota Department of Water and Natural Resources, approved by EPA pursuant to section 1425 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on October 24, 1984; the effective date of this program is December 7, 1984. This program consists of the following elements, as submitted to EPA in the State's program application.

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of South Dakota. This incorporation by reference was approved by the Director of the Federal Register effective December 7, 1984.

(1) South Dakota Codified Laws, sections 45-9-2, 45-9-4, 45-9-11, 45-9-13, 45-9-14, 45-9-15 (1983).

(2) Administrative Rules of South Dakota, sections 74:10:02 through 74:10:11 (inclusive) (1982).

(b) *Other laws.* The following statutes and regulations, although not incorporated by reference, also are part of the approved State-administered program:

(1) South Dakota Codified Laws, Chapter 45-9 (sections not cited above) (1983); 1-26 (1981).

(c)(1) The Memorandum of Agreement between EPA Region VIII and the South Dakota Department of Water and Natural Resources, signed by the EPA Regional Administrator on July 18, 1984.

(d) *Statement of legal authority.* (1) "Underground Injection Control Program for Class II Wells: Attorney General's Statement," signed by Mark V. Meierhery, Attorney General, South Dakota, on January 16, 1984.

(e) The Program Description and any other materials submitted as part of the original application or as supplements thereto.

[50 FR 7061, Feb. 20, 1985]

§ 147.2101 EPA-administered program.

(a) *Contents.* The UIC program for all Class I, III, IV and V wells, including those on Indian lands, and for Class II wells on Indian lands in the State of South Dakota is administered by EPA. This program consists of 40 CFR Parts 124, 144 and 146 and additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program for Class I, III, IV and V wells on all lands in South Dakota, including Indian lands, and for Class II wells on Indian lands only, is December 30, 1984.

[52 FR 17682, May 11, 1987]

§ 147.2102 Aquifer exemptions.

(a) This section identifies any aquifers or their portions exempted in accordance with §§ 144.7(b) and 146.4 of this chapter at the time of program promulgation. EPA may in the future exempt other aquifers or their portions, according to applicable procedures, without codifying such exemptions in this section. An updated list of exemptions will be maintained in the Regional office.

(b) Those portions of all aquifers located on Indian Lands, which meet the definition of USDW and into which existing Class II wells are injecting, are exempted within a ¼ mile radius of the well for the purpose of Class II injection activities only.

[49 FR 45308, Nov. 15, 1984]

§ 147.2103 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.

(a) *Maximum injection pressure*. (1) To meet the operating requirements of § 144.28(f)(3)(ii) (A) and (B) of this chapter, the owner or operator:

(i) Shall use an injection pressure no greater than the pressure established by the Regional Administrator for the field or formation in which the well is located. The Regional Administrator shall establish such a maximum pressure after notice, opportunity for comments, and opportunity for a public hearings, according to the provisions of Part 124, Subpart A of this chapter, and will inform owners and operators in writing of the applicable maximum pressure; or

(ii) May inject at a pressure greater than those specified in paragraph (a)(1)(i) of this section for the field or formation in which he is operating provided he submits a request in writing to the Regional Administrator, and demonstrates to the satisfaction of the Regional Administrator that such injection pressure will not violate the requirement of § 144.28(f)(3)(ii)(A) and (B). The Regional Administrator may grant such a request after notice, opportunity for comment, and opportunity for a public hearing, according to the provisions of Part 124, Subpart A of this chapter.

(2) Prior to such time as the Regional Administrator establishes field rules for maximum injection pressure based on data provided pursuant to paragraph (a)(2)(ii) of this section the owner or operator shall:

(i) Limit injection pressure to a value which will not exceed the operating requirements of § 144.28(f)(3)(ii); and

(ii) Submit to the Regional Administrator data acceptable to the Regional administrator which defines the fracture pressure of the formation in which injection is taking place. A single test may be submitted on behalf of two or more operators conducting operations in the same formation, if the Regional Administrator approves such submission.

(b) *Casing and cementing*. Where the Regional Administrator determines that the owner or operator of an existing enhanced recovery or hydrocarbon storage well may not be in compliance with the requirement of §§ 144.28(e) and 146.22, the owner or operator shall when required by the Regional Administrator:

(1) Protect USDWs by:

(i) Cementing surface casing by recirculating the cement to the surface from a point 50 feet below the lowermost USDW; or

(ii) Isolating all USDWs by placing cement between the outermost casing and the well bore; and

(2) Isolate any injection zones by placing sufficient cement to fill the calculated space between the casin and the well bore to a point 250 fee above the injection zone; and

(3) Use cement:

(i) Of sufficient quantity and qualit to withstand the maximum operatio pressure;

(ii) Which is resistant to deterior tion from formation and injectio fluids; and

(iii) In a quantity no less than 120 of the calculated volume necessary cement off a zone; and/or

(4) Comply with other requiremen which the Regional Administrat may specify in addition to or in lieu the requirements set forth in pa graphs (b) (1) through (3) of this s tion as needed to protect USDWs.

(The information collection requireme contained in paragraph (a)(2)(ii) were proved by the Office of Management Budget under control number 2040-0042

[49 FR 45308, Nov. 15, 1984]

§ 147.2104 Requirements for all wells.

(a) The owner or operator conv ing an existing well to an injec well shall check the condition of casing with one of the following ging tools;

(1) A pipe analysis log; or

(2) A caliper log.

(b) The owner or operator of a new injection well cased with plastic (PVC, ABS, or others) casings shall:

(1) Not construct a well deeper than 500 feet;

(2) Use cement and additives compatible with such casing material; and

(3) Cement the annular space above the injection intermal from the bottom of the blank casing to the surface.

(c) The owner or operator of a newly drilled well shall install centralizers as directed by the Regional Administrator.

(d) The owner or operator shall as required by the Regional Administrator:

(1) Protect USDWs by:

(i) Setting surface casing 50 feet below the lowermost USDW;

(ii) Cementing surface casing by recirculating the cement to the surface from a point 50 feet below the lowermost USDW; or

(iii) Isolating all USDWs by placing cement between the outermost casing and the well bore; and

(2) Isolate any injection zones by placing sufficient cement to fill the calculated space between the casing and the well bore to a point 250 feet above the injection zone; and

(3) Use cement:

(i) Of sufficient quantity and quality to withstand the maximum operating pressure; and

(ii) Which is resistant to deterioration from formation and injection fluids; and

(iii) In a quantity no less than 120% of the calculated volume necessary to cement off a zone.

(4) The Regional Administrator may approve alternate casing and cementing practices provided that the owner or operator demonstrates that such practices will adequately protect USDWs.

(e) *Area of review.* Notwithstanding the alternatives presented in § 146.6 of this chapter, the area of review shall be a fixed radius as described in § 146.6(b) of this chapter.

(f) The applicant must give separate notice of intent to apply for a permit to each owner of record of the land within one-quarter mile of the site. The addresses of those to whom notice is given and the description of how notice was given shall be submitted with the permit application. The notice shall include:

(1) The name and address of applicant;

(2) A brief description of the planned injection activities, including well location, name and depth of the injection zone, maximum injection pressure and volume, and fluid to be injected;

(3) The EPA contact person; and

(4) A statement that opportunity to comment will be announced after EPA prepares a draft permit.

This requirement may be waived by the Regional Administrator if he determines that individual notice to all land owners of record would be impractical.

[49 FR 45308, Nov. 15, 1984]

Subpart RR—Tennessee

§ 147.2150 State-administered program. [Reserved]

§ 147.2151 EPA-administered program.

(a) *Contents.* The UIC program for the State of Tennessee, including all Indian lands, is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, and 146 and the additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective dates.* Effective date for the UIC program on Indian lands is November 25, 1988. The effective date for the UIC program for the rest of Tennessee is June 25, 1984.

[53 FR 43090, Oct. 25, 1988]

§ 147.2152 Aquifer exemptions. [Reserved]

§ 147.2153 Existing Class I, II (except enhanced recovery and hydrocarbon storage) and III wells authorized by rule.

Maximum injection pressure. The owner or operator shall limit injection pressure to the lesser of:

(a) A value which will not exceed the operating requirements of § 144.28(f)(3) (i) or (ii) as applicable or

(b) A value for well head pressure calculated by using the following formula:

$Pm=(0.600-0.433\ Sg)d$

where

Pm=injection pressure at the well head in pounds per square inch
Sg=specific gravity of inject fluid (unitless)
d=injection depth in feet.

§ 147.2154 Existing Class II enhanced recovery and hydrocarbon storage wells authorized by rule.

(a) *Maximum injection pressure.* (1) To meet the operating requirements of § 144.28(f)(3)(ii) (A) and (B) of this chapter, the owner or operator:

(i) Shall use an injection pressure no greater than the pressure established by the Regional Administrator for the field or formation in which the well is located. The Regional Administrator shall establish such a maximum pressure after notice, opportunity for comment, and opportunity for a public hearing, according to the provisions of Part 124, Subpart A of this chapter, and will inform owners and operators in writing of the applicable maximum pressure; or

(ii) May inject at pressures greater than those specified in paragraph (a)(1)(i) of this section for the field or formation in which he is operating, provided he submits a request in writing to the Regional Administrator and demonstrates to the satisfaction of the Regional Administrator that such injection pressure will not violate the requirement of § 144.28(f)(3)(ii) (A) and (B). The Regional Administrator may grant such a request after notice, opportunity for comment, and opportunity for a public hearing, according to the provisions of Part 124, Subpart A of this chapter.

(2) Prior to such time as the Regional Administrator establishes rules for maximum injection pressure based on data provided pursuant to paragraph (a)(2)(ii) of this section the owner or operator shall:

(i) Limit injection pressure to a value which will not exceed the operating requirements of § 144.28(f)(3)(ii); and

(ii) Submit data acceptable to the Regional Administrator which defines the fracture pressure of the formation in which injection is taking place. A single test may be submitted on behalf of two or more operators conducting operations in the same formation, if the Regional Administrator approves such submission. The data shall be submitted to the Regional Administrator within one year of the effective date of this regulation.

(b) *Casing and cementing.* Where the Regional Administrator determines that the owner or operator of an existing enhanced recovery or hydrocarbon storage well may not be in compliance with the requirements of §§ 144.28(e) and 146.22, the owner or operator shall comply with paragraphs (b) (1) through (4) of this section, when required by the Regional Administrator:

(1) Protect USDWs by:

(i) Cementing surface casing by recirculating the cement to the surface from a point 50 feet below the lowermost USDW; or

(ii) Isolating all USDWs by placing cement between the outermost casing and the well bore; and

(2) Isolate any injection zones by placing sufficient cement to fill the calculated space between the casing and the well bore to a point 250 feet above the injection zone; and

(3) Use cement:

(i) Of sufficient quantity and quality to withstand the maximum operating pressure;

(ii) Which is resistant to deterioration from formation and injection fluids; and

(iii) In a quantity no less than 120% of the calculated volume necessary to cement off a zone.

(4) The Regional Administrator may specify other requirements in addition to or in lieu of the requirements set forth in paragraphs (b) (1) through (3) of this section, as needed to protect USDWs.

§ 147.2155 Requirements for all wells—area of review.

Notwithstanding the alternatives presented in § 146.6 of this chapter, the area of review shall be a minimum fixed radius as described in § 146.6(b) of this chapter.

Subpart SS—Texas

§ 147.2200 State-administered program—Class I, III, IV, and V wells.

Requirements for Class I, III, IV, and V wells. The UIC program for Class I, III, IV, and V wells in the State of Texas, except for those wells on Indian lands, is the State-administered program approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published on January 6, 1982 (47 FR 618); the effective date of this program is February 7, 1982. This program consists of the following elements, as submitted to EPA in the State's program application:

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Texas. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) Injection Well Act, Texas Water Code sections 27.002, 27.011 (Vernon Supp. 1984);

(b) *Other laws.* The following statutes and regulations, although not incorporated by reference except for select sections identified in paragraph (a) of this section, are also part of the approved State-administered UIC program:

(1) Texas Water Code Annotated, Chapter 5 (Vernon 1972 and Supp. 1982);

(2) Injection Well Act, Texas Water Code Annotated, Chapter 27 (Vernon 1972 and Supp. 1982);

(3) Rules of Texas Department of Water Resources, Chapter 27; Rules of Texas Water Development Board, Chapter 22.

(c) The Memorandum of Agreement between EPA Region VI and the Texas Department of Water Resources, signed by the EPA Regional Administrator on October 11, 1981.

(d) *Statement of legal authority.* "Underground Injection Control Program—Attorney General's Statement for Class I, III, IV, and V Injection Wells," signed by the Attorney General of Texas, June 11, 1981.

(e) The Program Description and any other materials submitted as part of the application or as supplements thereto.

(f) Certain Class V wells are under the UIC program of the Texas Railroad Commission approved on April 23, 1982, under the authorities cited in § 147.2201 of this part.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43091, Oct. 25, 1988]

§ 147.2201 State-administered program—Class II wells

The UIC program for Class II wells in the State of Texas, except for those wells on Indian lands, is the program administered by the Railroad Commission of Texas, approved by EPA pursuant to section 1425 of the SDWA. Notice of this approval was published in the Federal Register on April 23, 1982 (47 FR 17488). The effective date of this program was May 23, 1982. This program consists of the following elements, as submitted to EPA in the State's program application:

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Texas. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) Injection Well Act, Texas Water Code Annotated sections 27.031 and 27.033 (Vernon Supp. 1984);

(2) Texas Natural Resources Code Annotated sections 85.041, 85.045, 85.046 and 85.052 (Vernon 1978 and Supp. 1982);

(3) Rules Having Statewide General Application to Oil, Gas, and Geothermal Resource Operations, sections .051.02.02.000 to .051.02.02.080 (Railroad Commission of Texas, Oil and Gas Division, Revised 12-22-81), amended as follows:

(i) Amendment to 16 TAC section 3.9 (section .051.02.02.009) issued December 21, 1981, effective April 1, 1982;

(ii) Amendment to 16 TAC section 3.46 (section .051.02.02.046) issued December 21, 1981, effective April 1, 1982.

(iii) Amendment to 16 TAC section 3.71 (section .051.02.02.074) issued December 21, 1981, effective April 1, 1982.

(b) *Other laws.* The following statutes and regulations, although not incorporated by reference, are also part of the approved State-administered UIC program:

(1) Texas Water Code, Chapters 26, 27 and 29 (Vernon 1972 and Supp. 1982);

(2) Texas Natural Resources Code, Chapters 81, 85-89, 91 and 141 (Vernon 1978 and Supp. 1982);

(3) General Rules of Practice and Procedure, Subchapters A-J (Railroad Commission of Texas, adopted November 24, 1975, revised December 1980).

(c)(1) The Memorandum of Agreement between EPA Region VI and the Railroad Commission of Texas, signed by the EPA Regional Administrator on March 24, 1982.

(2) Letter from Director of Underground Injection Control, Railroad Commission of Texas, to Chief, Ground Water Protection Section, EPA Region VI, "Re: Letter of Clarification—UIC Program Application," March 21, 1982.

(d) *Statement of legal authority.* "Statement of Legal Authority of the Railroad Commission of Texas to conduct the Underground Injection Control Program," signed by Special Counsel, Railroad Commission of Texas, as submitted with "State of Texas Underground Injection Control Program Application for Primacy Enforcement Authority," prepared by the Railroad Commission of Texas, January 15, 1982.

(e) The Program Description and any other materials submitted as part of the application or as supplements thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43091, Oct. 25, 1988]

§ 147.2205 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in Texas is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146, and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date for the Indian lands program for the State of Texas is November 25, 1988.

[53 FR 43091, Oct. 25, 1988]

Subpart TT—Utah

§ 147.2250 State-administered program—Class I, III, IV, and V wells.

The UIC program for Class I, III, IV, and V wells in the State of Utah, except those on Indian lands, are administered by the Utah Department of Health, Division of Environmental Health, approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on January 9, 1983 (47 FR 2321). The effective date of this program is February 10, 1983. This program consists of the following elements, as submitted to EPA in the State's program application:

(a) *Incorporation by references.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Utah. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) Utah Pollution Control Act, Utah Code Annotated sections 26-11-2, -8 and -10 (Supp. 1983);

(2) State of Utah Department of Health, Division of Environmental Health, Wastewater Disposal Regulations, Part VII: Underground Injection Control Program (adopted January 20, 1982) (Certified Official Copy signed by Chairman, Utah Water Pollution Control Committee).

(b) *Other laws.* The following statutes and regulations, although not incorporated by reference except for select sections identified in paragraph (a) of this section, are also part of the approved State-administered program:

(1) Utah Pollution Control Act, Utah Code Annotated sections 26-11-1 to -20 (Supp. 1983).

(c)(1) The Memorandum of Agreement between EPA, Region VIII and the Utah Department of Health, Division of Environmental Health, signed by the Regional Administrator on August 16, 1982.

(2) Letter from Director, Utah Department of Health, Division of Environmental Health, Bureau of Water Pollution Control, to EPA Region VIII, "Re: Underground Injection Control Program—Utah," March 15, 1982.

(d) *Statement of legal authority.* (1) "Underground Injection Control Program—Attorney General's Statement," signed by Attorney General, State of Utah, January, 1982;

(2) Letter from Assistant Attorney General of Utah to Chief, Drinking Water Branch, EPA Region VIII, June 18, 1982.

(e) The Program Description and any other materials submitted as part of the application or supplements thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43091, Oct. 25, 1988]

§ 147.2251 State-administered program—Class II wells.

The UIC program for Class II wells in the State of Utah, except those on Indian lands, is the program administered by the Utah Department of Natural Resources, Division of Oil, Gas, and Mining, approved by EPA pursuant to section 1425 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on October 8, 1982 (47 FR 44561); the effective date of this program is November 7, 1982. This program consists of the following elements, as submitted to EPA in the State's program application:

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Utah. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) General Rules and Regulations and Rules of Practice and Procedure, by Order of: Board of Oil, Gas and Mining (of the State of Utah) (amended to March 23, 1978), as amended by Cause No. 190-4, Rule I—Underground Injection Criteria and Standards (adopted May 27, 1982).

(b) *Other laws.* [Reserved]

(c)(1) The Memorandum of Agreement between EPA, Region VIII and the Utah Department of Natural Resources, Division of Oil, Gas, and Mining and the Board of Oil, Gas and Mining, signed by the EPA Regional Administrator on July 19, 1983;

(2) Letter from Director, Division of Oil, Gas and Mining, Utah Department of Natural Resources and Energy, to Regional Administrator, EPA Region VIII, "Re: Aquifer Exemption Process," June 16, 1982;

(3) "Memorandum of Understanding" between Utah Department of Health and Utah Department of Natural Resources, dated March 5, 1981;

(4) "Second Addition to Agreement between the Department of Health and the Department of Natural Resources and Energy," dated December 15, 1981.

(d) *Statement of legal authority.* (1) Part III of "Primacy Application—Class II Underground Injection Wells," consisting of "Synopsis of Pertinent Statutes and Regulations," "Statement of Legal Authority," and "Certification by the Attorney General," by Assistant Attorney General, Department of Natural Resources and Energy, dated December 18, 1981;

(2) Letter from Assistant Attorney General, State of Utah, to EPA Region VIII, undated, received in the EPA Office of Regional Counsel June 10, 1982.

(e) The Program Description and any other materials submitted as part of the application or amendments thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43091, Oct. 25, 1988]

§ 147.2253 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in Utah is administered by EPA. The program for wells on the lands of the Navajo and Ute Mountain Ute consists of the requirements set forth at Subpart HHH of this part. The program for all other wells on Indian lands consists of the UIC program requirements of 30 CFR Parts 124, 144, 146, and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date for this program for all other Indian lands in Utah (as well as for the program of the Navajo and Ute Mountain Ute) is November 25, 1988.

[53 FR 40391, Oct. 25, 1988]

Subpart UU—Vermont

§ 147.2300 State-administered program.

The UIC program for all classes of wells for the State of Vermont, except for those on Indian lands, is the program administered by the Vermont Department of Water Resources and Environmental Engineering approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on June 22, 1984; the effective date of this program is July 6, 1984. This program consists of the following elements, as submitted to EPA in the State's program application.

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Vermont. This incorporation by reference was approved by the Director of the Federal Register July 6, 1984.

(1) Vt. Stat. Ann. tit. 10, sections 1251, 1259, 1263 (1973 and Supp. 1981), Effective date: July 1, 1982.

(2) Vermont Department of Water Resources and Environmental Engineering, Chapter 13 Water Pollution Control Regulations, Subchapter 13.UIC—Underground Injection Control, Discharges to Injection Wells, Effective Date: June 21, 1984.

(b) *Other laws.* The following statutes and regulations although not incorporated by reference, also are part of the approved State-administered program:

(1) Vt. Stat. Ann. tit. 10, sections 1251 through 1283 (1973 and Supp. 1981).

(2) Vt. Stat. Ann. tit. 10, sections 901 through 911 (1973 and Supp. 1981).

(3) Vt. Stat. Ann. tit. 3, sections 801 through 847 (1973 and Supp. 1981).

(c)(1) The Memorandum of Agreement between EPA Region I and the Vermont Agency of Environmental Conservation signed by the EPA Regional Administrator on January 16, 1984.

(d) *Statement of legal authority.* (1) "Vermont Attorney General's Statement for Classes I, II, III, IV and V Injection Wells," signed by Attorney General John J. Easton, Jr., as submitted with Vermont Application for Primary Enforcement Responsibility to Administer the Underground Water Source Protection Program Pursuant to the Safe Drinking Water Act and 40 CFR 145.21 through 145.24 (December 20, 1983).

(e) The Program Description and any other materials submitted as part of the original application or as supplements thereto.

(42 U.S.C. 300)

[49 FR 25634, June 22, 1984, as amended at 53 FR 43091, Oct. 25, 1988]

§§ 147.2301—147.2302 [Reserved]

§ 147.2303 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for Indian lands in Vermont is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date of the UIC program for Indian lands in Vermont is November 25, 1988.

[53 FR 43091, Oct. 25, 1988]

§§ 147.2304—147.2349 [Reserved]

Subpart VV—Virginia

§ 147.2350 State-administered program [Reserved]

§ 147.2351 EPA-administered program.

(a) *Contents.* The UIC program for the State of Virginia, including all

Indian lands, is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective dates.* The effective date for the UIC program on Indian lands is November 25, 1988. The effective date for the UIC program for the remainder of Virginia is June 25, 1988.

[53 FR 43091, Oct. 25, 1988]

§ 147.2352 Aquifer exemptions. [Reserved]

Subpart WW—Washington

§ 147.2400 State-administered program—Class I, II, III, IV, and V wells.

The UIC program for Class I, II, III, IV, and V wells in the State of Washington other then those on Indian lands, is the program administered by the Washington Department of Ecology, approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on August 9, 1984; the effective date of this program is September 24, 1984. This program consists of the following elements, as submitted to EPA in the State's program application.

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Washington. This incorporation by reference was approved by the Director of the Federal Register effective September 24, 1984.

(1) Revised Code of Washington section 90.48.020, 90.48.080, 90.48.160, and 90.48.162 (Bureau of National Affairs, 1983 Laws);

(2) Washington Administrative Code sections 173-218-010 to 173-218-110 (Bureau of National Affairs, 2/29/84);

(3) Washington Administrative Code sections 344-12-001 to 344-12-262 (1983 Ed.)

(b) *Other laws.* The following statutes and regulations although not incorporated by reference, also are part of the approved State-administered program:

(1) Revised Code of Washington, chapter 34.04 (Bureau of National Affairs, 1981 Laws), entitled "Administrative Procedure act";

(2) Revised Code of Washington, chapter 43.21A (Bureau of National Affairs, 1980 Laws), entitled "Department of Ecology," as amended by 1983 Washington Laws, Chapter 270;

(3) Revised Code of Washington, chapter 70.105 (Bureau of National Affairs, 1983 Laws), entitled "Hazardous Waste Disposal";

(4) Revised Code of Washington, chapter 78.52 (Bureau of National Affairs, 1983 Laws), entitled "Oil and Gas Conservation";

(5) Revised Code of Washington, chapter 90.48 (Bureau of National Affairs, 1986 Laws), entitled "Water Pollution Control."

(c)(1) The Memorandum of Agreement between EPA Region X and the Washington Department of Ecology, signed by the EPA Regional Administrator on May 14, 1984;

(2) Memorandum of Agreement between the Washington Department of Ecology and Oil and Gas Conservation Committee, Related to the Underground Injection Control Program for the State of Washington, signed March 23, 1984;

(3) Memorandum of Agreement between the Washington Department of Ecology and Washington Department of Natural Resources, Related to the Underground Injection Control Program for the State of Washington, signed March 23, 1984;

(4) Memorandum of Agreement between the Washington Department of Ecology and Department of Social and Health Services, Related to the Underground Injection Control Program for the State of Washington, signed March 23, 1984;

(d) *Statement of legal authority.* Letter from Attorney General of the State of Washington, by Senior Assistant Attorney General, to Director, Washington State Department of Ecology, "Re: Underground Injection Control Regulatory Program—Attorney General's Statement," February 28, 1984.

(e) The Program Description and any other materials submitted as part of the original applicaiton or as supplements thereto.

[49 FR 31876, Aug. 9, 1984]

§ 147.2403 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in the State of Washington is administered by EPA. This program, for all Indian lands except those of the Colville Tribe, consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date for the UIC program for Indian lands in Washington is November 25, 1988.

[53 FR 43091, Oct. 25, 1988]

§ 147.2404 EPA-administered program—Colville Reservation.

(a) The UIC program for the Colville Indian Reservation consists of a prohibition of all Class I, II, III and IV injection wells and of a program administered by EPA for Class V wells. This program consists of the UIC program requirements of 40 CFR Part 124, 144 and 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and EPA shall comply with these requirements. The prohibition on Class I–IV wells is effective November 25, 1988. No owner or operator shall construct, operate, maintain, convert, or conduct any other injection activity thereafter using Class I–IV wells.

(b) Owners and operators of Class I, II, III or IV wells in existence on the effective date of the program shall cease injection immediately. Within 60 days of the effective date of the program, the owner or operator shall submit a plan and schedule for plugging and abandoning the well for the Director's approval. The owner or operator shall plug and abandon the well according to the approved plan and schedule.

[53 FR 43091, Oct. 25, 1988]

Subpart XX—West Virginia

§§ 147.2450—147.2452 [Reserved]

§ 147.2453 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for all classes of wells on Indian lands in West Virginia is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144 and 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and EPA shall comply with these requirements.

(b) *Effective date.* The effective date for the UIC program on Indian lands in West Virginia is November 25, 1988.

[53 FR 43092, Oct. 25, 1988]

§§ 147.2454—147.2499 [Reserved]

Subpart YY—Wisconsin

§ 147.2500 State-administered program.

The UIC program for Class I, II, III, IV, and V wells in the State of Wisconsin, other than those on Indian lands as described in § 147.2510, is the program administered by the Wisconsin Department of Natural Resources, approved by EPA pursuant to SDWA section 1422. Notice of this approval was published in the FEDERAL REGISTER on September 30, 1983 (48 FR 44783); the effective date of this program is November 30, 1983. This program consists of a prohibition of all injection wells except heat pump return flow injection wells and may be found in the following elements, as submitted to EPA in the State's program application.

[49 FR 45309, Nov. 15, 1984]

§ 147.2510 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for Indian lands in the State of Wisconsin is administered by EPA. This program consists of 40 CFR Parts 144 and 146 and additional requirements set forth in this section. Injection well owners and operators, and EPA, shall comply with these requirements.

(b) *Requirements.* Notwithstanding the requirements of paragraph (a) of this section for Indian lands in Wisconsin no owner or operator shall construct, operate, maintain, or convert any Class I, II, III, IV or V injection well.

(c) *Effective date.* The effective date of the UIC program requirements for Indian lands in Wisconsin is December 30, 1984.

[49 FR 45309, Nov. 15, 1984]

Subpart ZZ—Wyoming

§ 147.2550 State-administered program—Class I, III, IV and V wells.

The UIC program for Class I, III, IV and V wells in the State of Wyoming, except those on Indian lands is the program administered by the Wyoming Department of Environmental Quality approved by EPA pursuant to section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on July 15, 1983 (48 FR 32344); the effective date of this program is August 17, 1983. The program consists of the following elements as submitted to EPA in the State's program application:

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Wyoming. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) Wyoming Environmental Quality Act, Wyoming Statutes sections 35-11-103, 35-11-301, 35-11-401, 35-11-405, 35-11-406, 35-11-408, 35-11-410, 35-11-415, 35-11-426 through 35-11-430 (1977 and Supp. 1983);

(2) Water Quality Rules and Regulations, Wyoming Department of Environmental Quality, Chapter III: Regulations for Permit to Construct, Install or Modify Public Facilities Capable or, (sic) Causing or Contributing to Pollution (certified copy, signed December 21, 1983);

(3) Water Quality Rules and Regulations, Wyoming Department of Environmental Quality, Chapter VIII: Quality Standards for Groundwaters of Wyoming (certified copy, signed April 9, 1980);

(4) Water Quality Rules and Regulations, Wyoming Department of Environmental Quality, Chapter IX: Wyoming Groundwater Pollution Control Permit (certified copy, signed April 9, 1980);

(5) Land Quality Rules and Regulations, Wyoming Department of Environmental Quality, Chapter XXI: In-Situ Mining.

(b) *Other laws.* The following statutes and regulations, although not incorporated by reference except for select sections identified in paragraph (a) of this section, are also part of the approved State-administered program:

(1) Wyoming Environmental Quality Act, Wyoming Statute sections 35-11-101 through 35-11-1207 (1977 and Supp. 1983);

(2) Article 9, Underground Water, Wyoming Statutes sections 41-3-901 through 41-3-938 (1977);

(3) Wyoming Administrative Procedure Act, Wyoming Statutes sections 9-4-101 through 9-4-115 (1977).

(c)(1) The Memorandum of Agreement between EPA, Region VIII and the Wyoming Department of Environmental Quality, signed by the EPA Regional Administrator on April 26, 1983.

(2) Letter from Regional Administrator, EPA Region VIII, to Governor of Wyoming, May 21, 1982, with Attachment (regarding aquifer exemptions);

(3) Letter from Governor of Wyoming to Regional Administrator, EPA Region VIII, "Re: Underground Injection Control (UIC) Program—Aquifer Exemption Issues," June 7, 1982;

(4) Letter from Regional Administrator, EPA Region VIII to Governor of Wyoming, "Re: Underground Injection Control (UIC) Program—Aquifer Exemption Issues," June 25, 1982;

(5) Letter from Director, Wyoming Department of Environmental Quality, to Acting Director, Water Management Division, EPA Region VIII, December 1, 1982.

(d) *Statement of legal authority.* (1) "Attorney General's Statement—Wyoming Statutory and Regulatory Authority for Assumption of the Underground Injection Control Program

Pursuant to the Federal Safe Drinking Water Act," signed by Attorney General and Assistant Attorney General for the State of Wyoming, September 22, 1982;

(2) Letter from Attorney General for the State of Wyoming to Acting Regional Counsel, EPA Region VIII, "Re: Wyoming Assumption of the UIC Program—$36, Chapter IX, Wyoming Water Quality Rules and Regulations," November 24, 1982.

(e) The Program Description and any other materials submitted as part of the application or amendment thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43092, Oct. 25, 1988]

§ 147.2551 State-administered program—Class II wells.

The UIC program for Class II wells in the State of Wyoming, except those on Indian lands, is the program administered by the Wyoming Oil and Gas Conservation Commission, approved by EPA pursuant to section 1425 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on November 23, 1982 (47 FR 52434); the effective date of this program is December 23, 1982. This program consists of the following elements as submitted to EPA in the State's program application:

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the State of Wyoming. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) Rules and Regulations of the Wyoming Oil and Gas Conservation Commission, as amended by Cause No. 1, Order No. 29, Docket No. 222-81 (dated October 23, 1981), as amended by Correction Order, Cause No. 1, Order No. 29, Docket No. 222-81 (dated November 10, 1981).

(b) *Other laws.* The following statutes and regulations, although not incorporated by reference, are also part of the approved State-administered program:

(1) Chapter 5, Oil and Gas, Wyoming Statutes Annotated sections 30-5-101 through 30-5-126 (1977).

(c)(1) The Memorandum of Agreement between EPA, Region VIII and the Wyoming Oil and Gas Conservation Commission, signed by the EPA Regional Administrator on June 2, 1982.

(2) Amendment No. 1 to the Memorandum of Agreement, dated December 22, 1982;

(3) Letter from State Oil and Gas Supervisor, Wyoming Oil and Gas Conservation Commission, to Acting Director, Water Management Division, EPA, Region VIII, "Re: Application for Primacy in the Regulation of Class II Injection Wells," March 8, 1982;

(4) Letter from State Oil and Gas Supervisor, Wyoming Oil and Gas Conservation Commission, to EPA Region VIII, "Re: Regulation of Liquid Hydrocarbon Storage Wells Under the UIC Program," July 1, 1982;

(5) Memorandum of Agreement Between the Wyoming State Board of Control, State Engineer, Oil and Gas Conservation Commission, and the Department of Environmental Quality, dated October 14, 1981.

(d) *Statement of legal authority.* (1) "Statement of Legal Authority" and "State Review of Regulations and Statutes Relevant to the UIC Program—Class II Wells," signed by Special Assistant Attorney General for the State of Wyoming, as submitted with "Wyoming Oil and Gas Conservation Commission, Application for Primacy in the Regulation of Class II Injection Wells under section 1425 of the Safe Drinking Water Act," November 1981;

(2) Letter from Special Assistant Attorney General for the State of Wyoming to Assistant Regional Counsel, EPA Region VIII, May 13, 1982;

(3) Letter from Special Assistant Attorney General for the State of Wyoming to Assistant Regional Counsel, EPA Region VIII, July 1, 1982.

(e) The Program Description and other material submitted as part of the application or amendments thereto.

[49 FR 20197, May 11, 1984, as amended 53 FR 43092, Oct. 25, 1988]

147.2553 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for ndian lands in Wyoming is adminis- ered by EPA. This program consists f the UIC program requirements of 0 CFR Parts 124, 144, 146 and any ad- litional requirements set forth in the emainder of this subpart. Injection vell owners and operators and EPA hall comply with these requirements.

(b) *Effective date.* The effective date for the UIC program on Indian lands n Wyoming is November 25, 1988.

[53 FR 43092, Oct. 25, 1988]

§ 147.2554 Aquifer exemptions.

In accordance with § 144.7(b) and § 146.4 of this chapter, those portions of aquifers currently being used for injection in connection with Class II (oil and gas) injection operations on the Wind River Reservation, which are described below, are hereby exempted for the purpose of Class II injection activity. This exemption applies only to the aquifers tabulated below, and includes those portions of the aquifers defined on the surface by an outer boundary of those quarter-quarter sections dissected by a line drawn parallel to, but one-quarter mile outside, the field boundary, and is restricted to extend no further than one-quarter mile outside the Reservation boundary. Maps showing the exact boundaries of the field may be consulted at the EPA's Region 8 Office, and at the EPA Headquarters in Washington, DC.

AREAS TO BE EXEMPTED FOR THE PURPOSE OF CLASS II INJECTION ON THE WIND RIVER RESERVATION

Formation	Approximate depth	Location
Steamboat Butte Field		
Phosphoria	6,500–7,100	T3N, R1W—W/2 Sec. 4, Sec. 5, E/2 Sec. 6, NE/4 Sec. 8, W/2 Sec. 9. T4N, R1W—W/2 Sec. 29, E/2 Sec. 30, E/2 Sec. 31, Sec. 32.
Tensleep	6,900–7,500	T3N, R1W—W/2 Sec. 4, Sec. 5, E/2 Sec. 6, NE/4 Sec. 8, W/2 Sec. 9. T4N, R1W—W/2 Sec. 29, E/2 Sec. 30, E/2 Sec. 31, Sec. 32.
Winkleman Dome Field		
Tensleep	2,800–3,300	T2N, R1W—SW/4 Sec. 17, Sections 18, 19, 20, 29, NE/4 Sec. 30. T2N, R2W—E/2 Sec. 13, NE/4 Sec. 24.
Phosphoria	2,800–3,600	T2N, R1W—SW/4 Sec. 17, Sections 18, 19, 20, 29, NE/4 Sec. 30. T2N, R2W—E/2 Sec. 13, NE/4 Sec. 24.
Nugget	1,100–1,500	T2N, R1W—SW/4 Sec. 17, Sections 18, 19, 20, 29, NE/4 Sec. 30. T2N, R2W—E/2 Sec. 13, NE/4 Sec. 24.
Lander Field		
Phosphoria	1,100–3,800	T2S, R1E—Sections 12 and 13, E/2 Sec. 24, NE/4 Sec. 25. T2S, R2E—W/2 Sec. 18, W/2 Sec. 19, Sec. 30. T33N, R99W—Sec. 4.
NW Sheldon Field		
Crow Mountain and Cloverly	3,400–3,600	T6N, R3W—SE/4 Sec. 35, SW/4 Sec. 36. T5N, R3W—N/2 Sec. 1.
Circle Ridge Field		
Tensleep	1,500–1,800	T6N, R2W—Sec. 6, N/2 Sec. 7. T7N, R3W—SE/4 Sec. 36. T7N, R2W—SW/4 Sec. 31. T6N, R3W—E/2 Sec. 1.
Phosphoria	800–1,800	T7N, R3W—S/2 Sec. 36. T6N, R3W—NE/4 Sec. 1.
Amsden	700–1,200	T6N, R3W—Sec. 6.
Rolff Lake Field		
Crow Mountain	3,500–3,700	T6N, R3W—SW/4 Sec. 26, NW/4 Sec. 27.

[53 FR 43092, Oct. 25, 1988]

Subpart AAA—Guam

§ 147.2600 State-administered program.

The UIC program for all classes of wells in the territory of Guam, except those on Indian lands, is the program administered by the Guam Environmental Protection Agency, approved by EPA pursuant to SDWA section 1422. Notice of this approval was published in the FEDERAL REGISTER on May 2, 1983 (47 FR 19717); the effective date of this program is June 1, 1983. This program consists of the following elements, as submitted to EPA in the State's program application:

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the territory of Guam. This incorporation by reference was approved by the Director of the Federal Register on June 25, 1984.

(1) Water Resources Conservation Act, Government Code of Guam sections 57021-57025, Pub. L. 9-31 (March 9, 1967), as amended by Pub. L. 9-76 (July 29, 1967), as amended by Pub. L. 12-191 (December 30, 1974);

(2) Water Pollution Control Act, Government Code of Guam sections 57042 and 57045, Pub. L. 9-76 (July 29, 1967), as amended by Pub. L. 9-212 (August 5, 1968), as amended by Pub. L. 10-31 (March 10, 1969), as amended by Pub. L. 12-191 (December 30, 1974);

(3) Guam Environmental Protection Agency, Underground Injection Control Regulations, Chapters 1-9, as revised by amendments adopted September 24, 1982;

(4) Guam Environmental Protection Agency, Water Quality Standards, Section I-IV (approved September 25, 1981, effective November 16, 1981).

(b) *Other laws.* The following statutes and regulations, although not incorporated by reference except for specific sections identified in paragraph (a) of this section, are also part of the approved State-administered program:

(1) Government Code of Guam, Title XXV, Chapters I-III (sections 24000-24207);

(2) Government Code of Guam, Title LXI, Chapters I-III (sections 57000-57051);

(3) Government Code of Guam, Title LXI, Chapters VI (sections 57120-57142);

(4) Government Code of Guam, Title LXI, Chapters VIII (sections 57170-57188);

(5) Government Code of Guam, Title LXI, Chapters XII (sections 57285-57299);

(c) The Memorandum of Agreement between EPA, Region IX and the Guam Environmental Protection Agency signed by the Regional Administrator on January 14, 1983.

(d) *Statement of legal authority.* (1) Letter from Attorney General of Guam to Regional Administrator, Region IX, "Re: Attorney General's Statement for Underground Injection Control Program (UIC), Ground Water Program Guidance #16" May 12, 1982;

(2) Letter from Attorney General of Guam to Regional Administrator, Region IX, "Re: Additional comments to be incorporated into the May 12, 1982, Attorney General's Statement for Underground Injection Control Program," September 2, 1982.

(e) The Program Description and any other materials submitted as part of the application or amendments thereto.

[49 FR 20197, May 11, 1984, as amended at 53 FR 43092, Oct. 25, 1988]

§ 147.2601 EPA-administered program—Indian lands.

(a) *Contents.* The UIC program for Indian lands in the territory of Guam is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with the requirements.

(b) *Effective date.* The effective date for the UIC program on Indian lands in the territory of Guam is November 25, 1988.

[53 FR 43093, Oct. 25, 1988]

Subpart BBB—Puerto Rico

§ 147.2650 State-administered program. [Reserved]

§ 147.2651 EPA-administered program.

(a) *Contents.* The UIC program for Puerto Rico, including all Indian lands, is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with the requirements.

(b) *Effective dates.* The effective date of the UIC program for non-Indian lands in Puerto Rico is December 30, 1984. The effective date of the UIC program on Indian lands in Puerto Rico is November 25, 1988.

[53 FR 43093, Oct. 25, 1988]

Subpart CCC—Virgin Islands

§ 147.2700 State-administered program. [Reserved]

§ 147.2701 EPA-administered program.

(a) *Contents.* The UIC program for the Virgin Islands, including all Indian lands, is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with the requirements.

(b) *Effective dates.* The effective date of the UIC program for non-Indian lands in the Virgin Islands is December 30, 1984. The effective date for Indian lands in the Virgin Islands is November 25, 1988.

[53 FR 43093, Oct. 25, 1988]

Subpart DDD—American Samoa

§ 147.2750 State-administered program. [Reserved]

§ 147.2751 EPA-administered program.

(a) *Contents.* The UIC program for American Samoa, including Indian lands, is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with the requirements.

(b) *Effective dates.* The effective date for the UIC program on non-Indian lands is June 25, 1984. The effective date of the UIC program on Indian lands is November 25, 1988.

[53 FR 43093, Oct. 25, 1988]

§ 147.2752 Aquifer exemptions. [Reserved]

Subpart EEE—Commonwealth of the Northern Mariana Islands

§ 147.2800 State-administered program—Class I, II, III, IV, and V wells.

The UIC program for Class I, II, III, IV, and V wells in the Commonwealth of the Northern Mariana Islands, other than those on Indian lands, is the program administered by the Commonwealth of the Northern Mariana Islands Division of Environmental Quality approved by EPA pursuant to Section 1422 of the SDWA. Notice of this approval was published in the FEDERAL REGISTER on January 18, 1985; the effective date of this program is August 30, 1985. This program consists of the following elements, as submitted to EPA in the State's program application.

(a) *Incorporation by reference.* The requirements set forth in the State statutes and regulations cited in this paragraph are hereby incorporated by reference and made a part of the applicable UIC program under the SDWA for the Commonwealth of the Northern Mariana Islands. This incorporation by reference was approved by the Director of the FEDERAL REGISTER effective July 31, 1985.

(1) CNMI Environmental Protection Act, 2 CMC sections 3101, *et seq.* (1984);

(2) CNMI Coastal Resources Management Act, 2 CMC sections 1501, *et seq.* (1984);

(3) CNMI Drinking Water Regulations, Commonwealth Register, Volume 4, Number 4 (August 15, 1982);

(4) CNMI Underground Injection Control Regulations, Commonwealth Register, Volume 6, Number 5 (May 15, 1984, amended November 15, 1984, January 15, 1985);

(5) CNMI Coastal Resources Management Regulations, Commonwealth Register, Volume 6, Number 12, December 17, 1984.

(b)(1) The Memorandum of Agreement between EPA Region IX and the Commonwealth of the Northern Mariana Islands Division of Environmental Quality, signed by the EPA Regional Administrator on May 3, 1985;

(c) *Statement of legal authority.* Statement from Attorney General Commonwealth of the Northern Mariana Islands, "Underground Injection Control Program—Attorney General's Statement," signed on October 10, 1984.

(d) The Program Description and any other materials submitted as part of the original application or as supplements thereto.

[50 FR 28943, July 17, 1985]

§ 147.2801 EPA-administered program.

(a) *Contents.* The UIC program for Indian lands in the Commonwealth of the Northern Mariana Islands is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with the requirements.

(b) *Effective date.* The effective date of the UIC program for Indian lands is November 25, 1988.

[53 FR 43093, Oct. 25, 1988]

§ 147.2802 Aquifer exemptions. [Reserved]

Subpart FFF—Trust Territory of the Pacific Islands

§ 147.2850 State-administered program. [Reserved]

§ 147.2851 EPA-administered program.

(a) *Contents.* The UIC program for the Trust Territory of the Pacific Islands, including Indian lands, is administered by EPA. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, 146 and any additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply wih the requirements.

(b) *Effective dates.* The effective date of the UIC program for non-Indian lands of the Trust Territory of the Pacific Islands is June 25, 1984. The effective date for the Indian lands is November 25, 1988.

[53 FR 43093, Oct. 25, 1988]

§ 147.2852 Aquifer exemptions. [Reserved]

Subpart GGG—Osage Mineral Reserve—Class II Wells

AUTHORITY: Safe Drinking Water Act, 42 U.S.C. 300h.

SOURCE: 49 FR 45309, Nov. 15, 1984, unless otherwise noted.

§ 147.2901 Applicability and scope.

This subpart sets forth the rules and permitting requirements for the Osage Mineral Reserve, Osage County, Oklahoma, Underground Injection Control Program. The regulations apply to owners and operators of Class II injection wells located on the Reserve, and to EPA.

§ 147.2902 Definitions.

Most of the following terms are defined in § 144.3, and have simply been reproduced here for the convenience of the reader. This section also includes definitions of some terms unique to the Osage program. Terms used in this subpart are defined as follows:

Administrator—the Administrator of the United States Environmental Protection Agency, or an authorized representative.

Aquifer—a geologic formation, group of formations, or part of a formation that is capable of yielding a significant amount of water to a well or spring.

BIA—The "Bureau of Indian Affairs," United States Department of Interior.

Casing—a pipe or tubing of varying diameter and weight, lowered into borehole during or after drilling in order to support the sides of the hole and, thus, prevent the walls from caving, to prevent loss of drilling mud into porous ground, or to prevent water, gas, or other fluid from entering the hole.

Cementing—the operation whereby a cement slurry is pumped into a drilled hole and/or forced behind the casing.

Class II Wells—wells which inject fluids:

(a) Which are brought to the surface in connection with conventional oil or natural gas production and may be commingled with waste waters from gas plants which are an integral part of production operations, unless those waters would be classified as a hazardous waste at the time of injection;

(b) For enhanced recovery of oil or natural gas; and

(c) For storage of hydrocarbons which are liquid at standard temperature and pressure.

Existing Class II Wells—wells that were authorized by BIA and constructed and completed before the effective date of this program.

New Class II Wells—wells constructed or converted after the effective date of this program, or which are under construction on the effective date of this program.

Confining bed—a body of impermeable or distinctly less permeable material stratigraphically adjacent to one or more aquifers.

Confining zone—a geologic formation, group of formations, or part of a formation that is capable of limiting fluid movement above an injection zone.

Contaminant—any physical, chemical, biological, or radiological substance or matter in water.

Disposal well—a well used for the disposal of waste into a subsurface stratum.

EPA—The United States Environmental Protection Agency.

Fault—a surface or zone of rock fracture along which there has been displacement.

Fluid—material or substance which moves or flows whether in a semisolid, liquid, sludge, gas or any other form or state.

Formation—a body of rock characterized by a degree of lithologic homogeneity which is prevailingly, but not necessarily, tabular and is mappable on the earth's surface or traceable in the subsurface.

Freshwater—"Underground source of drinking water."

Ground water—water below the land surface in a zone of saturation.

Injection well—a well into which fluids are being injected.

Injection zone—a geological formation, group of formations, or part of a formation receiving fluids through a well.

Lithology—the description of rocks on the basis of their physical and chemical characteristics.

Owner/operator—the owner or operator of any facility or activity subject to regulation under the Osage UIC program.

Packer—a device lowered into a well to produce a fluid-tight seal within the casing.

Permit—an authorization issued by EPA to implement UIC program requirements. Permit does not include the UIC authorization by rule or any permit which has not yet been the subject of final Agency action.

Plugging—the act or process of stopping the flow of water, oil or gas into or out of a formation through a borehole or well penetrating that formation.

Pressure—the total load or force per unit area acting on a surface.

Regional Administrator—the Regional Administrator of Region 6 of the United States Environmental Protection Agency, or an authorized representative.

Subsidence—the lowering of the natural land surface in response to: Earth movements; lowering of fluid pressure; removal of underlying supporting material by mining or solution solids, either artificially or from natural causes; compaction due to wetting (hydrocompaction); oxidation of organic matter in soils; or added load on the land surface.

Underground source of drinking water—an aquifer or its portion:

(a)(1) Which supplies any public water system; or

(2) Which contains a sufficient quantity of ground water to supply a public water system; and

(i) Currently supplies drinking water for human consumption; or

(ii) Contains fewer than 10,000 mg/1 total dissolved solids; and

(b) Which is not an exempted aquifer.

USDW—underground source of drinking water.

Well—a bored, drilled, or driven shaft, or a dug hole whose depth is greater than the largest surface dimension.

Well injection—the subsurfac emplacement of fluids through a bored, drilled, or driven well; or through a dug well, where the depth of the dug well is greater than the largest surface dimension.

Well workover—any reentry of an injection well; including, but not limited to, the pulling of tubular goods, cementing or casing repairs; and excluding any routine maintenance (e.g. reseating the packer at the same depth, or repairs to surface equipment).

§ 147.2903 Prohibition of unauthorized injection.

(a) Any underground injection, except as authorized by permit or rule issued under the UIC program, is prohibited. The construction or operation of any well required to have a permit is prohibited until the permit has been issued.

(b) No owner or operator shall construct, operate, maintain, convert, plug, or abandon any injection well, or conduct any other injection activity, in a manner that allows the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause the violation of any primary drinking water regulation under 40 CFR Part 142 or may otherwise adversely affect the health of persons. The applicant for a permit shall have the burden of showing that the requirements of this paragraph are met.

(c) Injection between the outermost casing protecting underground sources of drinking water and the well bore is prohibited.

§ 147.2904 Area of review.

(a) The area of review for an injection well or project will be a fixed radius of one-forth of a mile from the well, field or project.

(b) The zone of endangering influence is the lateral area around the injection well or project in which the injection zone pressures may cause movement of fluid into an underground source of drinking water (USDW) if there are improperly sealed, completed or abandoned wells present. A zone of endangering influence may be determined by EPA through the use of an appropriate formula that addresses the relevant geologic, hydrologic, engineering and operational features of the well, field, or project.

§ 147.2905 Plugging and abandonment.

The owner/operator shall notify the Osage UIC office within 30 days of the date injection has terminated. The well must be plugged within 1 year after termination of injection. The Regional Administrator may extend the time to plug, but only if no fluid movement into a USDW will occur, and the operator has presented a viable plan for utilizing the well within a reasonable time.

(a) Until an injection well has been properly plugged and abandoned, annual reports to the Regional Administrator on well status, and mechanical integrity tests as outlined in §§ 147.2912 and 147.2920 will be required, whether or not injection has ceased.

(b) All wells shall be plugged to prevent movement of fluid into an USDW.

(c) The owner/operator shall notify the Osage UIC office by certified mail at least 5 days prior to the commencement of plugging operations. The Osage UIC office may waive or reduce the 5-day notice requirement when a qualified EPA representative is available to witness the plugging operation. The following information must be submitted as part of the notification:

(1) Type and number of plugs to be used;

(2) Elevation of top and bottom of each plug;

(3) Method of plug placement; and

(4) Type, grade and quantity of cement to be used.

(d) The well shall be kept full of mud as casing is removed. No surface casing shall be removed without written approval from the Regional Administrator.

(e)(1) If surface casing is adequately set and cemented through all freshwater zones (set to at least 50 feet below the base of freshwater), a plug shall be set at least 50 feet below the shoe of the casing and extending at least 50 feet above the shoe of the casing, or

(2) If the surface casing and cementing is inadequate, the well bore shall be filled with cement from a point 50 feet below the base of fresh water to a point 50 feet above the shoe of the surface casing, and any additional plugs as required by the Osage UIC office and/or the Osage Agency.

(3) In all cases, the top 20 feet of the well bore below 3 feet of ground surface shall be filled with cement. Surface casing shall be cut off 3 feet below ground surface and covered with a secure steel cap on top of the surface pipe. The remaining 3 feet shall be filled with dirt.

(f)(1) Except as provided in paragraph (f)(2) of this section, each producing or receiving formation shall be sealed off with a 50-foot cement plug placed at the base of the formation and a 50-foot cement plug placed at the top of the formation.

(2) The requirement in paragraph (f)(1) of this section does not apply if the producing/receiving formation is already sealed off from the well bore with adequate casing and cementing behind casing, and casing is not to be removed, or the only openings from the producing/receiving formation into the well bore are perforations in the casing, and the annulus between the casing and the outer walls of the well is filled with cement for a distance of 50 feet below the base of the formation and 50 feet above the top of the formation. When such conditions exist, a bridge plug capped with 10 feet of cement set at the top of the producing formation may be used.

(g) When specified by the Osage UIC office, any uncased hole below the shoe of any casing to be left in the well shall be filled with cement to a depth of at least 50 feet below the casing shoe, or the bottom of the hole, and the casing above the shoe shall be filled with cement to at least 50 feet above the shoe of the casing. If the well has a screen or liner which is not to be removed, the well bore shall be filled with cement from the base of the screen or liner to at least 50 feet above the top of the screen or liner.

(h) All intervals between cement plugs in the well bore shall be filled with mud.

(i) A report containing copies of the cementing tickets shall be submitted to BIA within 10 days of plugging completion.

(j) A surety bond must be on file with the Bureau of Indian Affairs (BIA), and shall not be released until the well has been properly plugged and the Regional Administratior has agreed to the release of the bond.

§ 147.2906 Emergency permits.

(a) An emergency permit may be issued if:

(1) There will be an imminent health hazard unless an emergency permit is issued; or

(2) There will be a substantial and irretrievable loss of oil and gas resources, timely application for a permit could not practicably have been made, and injection will not result in movement of fluid into an USDW; or

(3) There will be a substantial delay in oil or gas production, and injection will not result in movement of fluid into an USDW.

(b) *Requirements*—(1) *Permit duration.* (i) Emergency permits issued to avoid an imminent health threat may last no longer than the time necessary to prevent the hazard.

(ii) Emergency permits issued to prevent a substantial and irretrievable loss of oil or gas resources shall be for no longer than 90 days, unless a complete permit application has been submitted during that time; in which case the emergency permit may be extended until a final decision on the permit application has been made.

(iii) Emergency permits to avoid a substantial delay in oil or gas production shall be issued only after a complete permit application has been submitted and shall be effective until a final decision on the permit application is made.

(2) Notice of the emergency permit will be given by the Regional Administrator according to the notice procedure for a draft permit within 10 days after issuance.

(3) An emergency permit may be oral or written. If oral, a written emergency permit must be issued within five calendar days.

§ 147.2907 Confidentiality of information.

(a) The following information cannot be claimed confidential by the submitter:

(1) Name and address of permit applicant or permittee.

(2) Information concerning the existence, absence or level of contaminants in drinking water.

(b) Other information claimed as confidential will be processed in accordance with 40 CFR Part 2.

§ 147.2908 Aquifer exemptions.

(a) After notice and opportunity for a public hearing, the Administrator may designate any aquifer or part of an aquifer as an exempted aquifer.

(b) An aquifer or its portion that meets the definition of a USDW may be exempted by EPA from USDW status if the following conditions are met:

(1) It does not currently serve as a source of drinking water, and

(2) It cannot now and will not in the future serve as a source of drinking water because:

(i) It is hydrocarbon producing, or can be demonstrated by a permit applicant as a part of a permit application for a Class II operation to contain hydrocarbons that are expected to be commercially producible (based on historical production or geologic information); or

(ii) It is situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical; or

(iii) It is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption; or

(3) The Total Dissolved Solids content of the groundwater is more than 3,000 and less than 10,000 mg/1 and it is not reasonably expected to supply a public water system.

§ 147.2909 Authorization of existing wells by rule.

All existing Class II injection wells (wells authorized by BIA and constructed or completed on or before the effective date of the Osage UIC program) are hereby authorized. Owners or operators of wells authorized by rule must comply with the provisions of §§ 147.2903, 147.2905, 147.2907, and 147.2910 through 147.2915.

§ 147.2910 Duration of authorization by rule.

Existing Class II injuction wells are authorized for the life of the well, subject to the obligation to obtain a permit if specifically required by the Regional Administrator pursuant to § 147.2915.

§ 147.2911 Construction requirements for wells authorized by rule.

All Class II wells shall be cased and cemented to prevent movement of fluids into USDWs. The Regional Administrator shall review inventory information, data submitted in permit applications, and other records, to determine the adequacy of constructio (completion) or existing injectio wells. At the Regional Administrator' discretion, well casing and cementin may be considered adequate if it meet the BIA requirements that were i effect at the time of constructio (completion) and will not result i movement of fluid into an USDW. I the Regional Administrator deter mines that the construction of a we authorized by rule is inadequate, h shall require a permit, or he sha notify the owner/operator and th owner/operator shall correct the pro lem according to instructions from th Regional Administrator. All corre tions must be completed within o year of owner/operator notification inadequacies.

§ 147.2912 Operating requirements for wells authorized by rule.

(a) Each well authorized by rule must have mechanical integrity. Mechanical integrity must be demonstrated within five years of program adoption. The Regional Administrator will notify the well owner/operator three months before proof of mechanical integrity must be submitted to EPA. The owner/operator must contact the Osage UIC office at least five days prior to testing. The owner/operator may perform the mechanical integrity test prior to receiving notice from the Regional Administrator, provided the Osage UIC office is notified at least five days in advance. Conditions of both paragraphs (a)(1) and (a)(2) of this section must be met.

(1) There is no significant leak in the casing, tubing or packer. This may be shown by the following:

(i) Performance of a pressure test of the casing/tubing annulus to at least 200 psi, or the pressure specified by the Regional Administrator, to be repeated thereafter, at five year intervals, for the life of the well (pressure tests conducted during well operation shall maintain an injection/annulus pressure differential of at least 100 psi through the tubing length); or

(ii) Maintaining a positive gauge pressure on the casing/tubing annulus (filled with liquid) and monitoring the pressure monthly and reporting of the pressure information annually; or

(iii) Radioactive tracer survey; or

(iv) For enhanced recovery wells, records of monitoring showing the absence of significant changes in the relationship between injection pressure and injection flow rate at the well head, following an initial pressure test as described by paragraph (a)(1)(i) or (v) of this section; or

(v) Testing or monitoring programs approved by the Regional Administrator on a case-by-case basis, and

(2) There is no significant fluid movement into a USDW through vertical channels adjacent to the well bore. This may be shown by any of the following:

(i) Cementing records (need not be reviewed every five years);

(ii) Tracer survey (in appropriate hydrogeologic settings; must be used in conjunction with at least one of the other alternatives);

(iiii) Temperature log;

(iv) Noise log; or

(v) Other tests deemed acceptable by the Regional Administrator.

(b) Injection pressure at the wellhead shall be limited so that it does not initiate new fractures or propagate existing fractures in the confining zone adjacent to any UDSW.

(1) For existing Class II salt water disposal wells, The owner/operator shall, except during well stimulation, use an injection pressure at the wellhead no greater than the pressure calculated by using the following formula:

$$Pm=(0.75-0.433Sg)d$$

where:

Pm=injection pressure at the wellhead in pounds per square inch

Sg=specific gravity of injected fluid (unitless)

d=injection depth in feet.

Owner/operator of wells shall comply with the above injection pressure limits no later than one year after the effective date of this regulation.

(2) For existing Class II enhanced recovery wells, the owner or operator:

(i) Shall use an injection pressure no greater than the pressure established by the Regional Administrator for the field or formation in which the well is located. The Regional Administrator shall establish such a maximum pressure after notice, opportunity for comment, and opportunity for a public hearing according to the provisions of Part 124, Subpart A of this chapter, and will inform owners and operators in writing of the applicable maximum pressure.

(ii) Prior to such time as the Regional Administrator establishes rules for maximum injection pressures based on data provided pursuant to paragraph (b)(2)(ii)(B) of this section the owner/operator shall:

(A) Limit injection pressure at the wellhead to a value which will not initiate new fractures or propagate existing fractures in the confining zone adjacent to any USDW; and

(B) Submit data acceptable to the Regional Administrator which defines the fracture pressure of the formation in which injection is taking place. A single test may be submitted on behalf of two or more operators conducting operations in the same formation, if the Regional Administrator approves such submission. The data shall be submitted to the Regional Administrator within one year of the effective date of this program.

(c) Injection wells or projects which have exhibited failure to confine injected fluids to the authorized injection zone or zones may be subject to restriction of injection volume and pressure, or shut-down, until the failure has been identified and corrected.

(The information collection requirements contained in paragraphs (a)(1) (ii) through (v) and (a)(2) (i) through (v) were approved by the Office of Management and Budget under control number 2040-0042)

§ 147.2913 Monitoring and reporting requirements for wells authorized by rule.

(a) The owner/operator has the duty to submit inventory information to the Regional Administrator upon request. Such request may be a general request to all operators in the County (e.g., public notice, or mailout requesting verification of information).

(b) The operator shall monitor the injection pressure (psi) and rate (bbl/day) at least monthly, with the results reported annually. The annual report shall specify the types of methods used to generate the monitoring data.

(c) The owner/operator shall notify the Osage UIC office within 30 days of any mechanical failure or down-hole problems involving well integrity, well workovers, or any noncompliance. As required, operators must apply for and obtain a workover permit from the Bureau of Indian Affairs Osage Agency before reentering an injection well. If the condition may endanger an USDW, the owner/operator shall notify the Osage UIC office orally within 24 hours, with written notice including plans for testing and/or repair to be submitted within five days. If all the information is not available within five days, a followup report must be submitted with 30 days.

(d) The owner/operator shall determine the nature of injected fluids initially, when the nature of injected fluids is changed or when new constituents are added. The records should reflect the source of character of the new fluid and the date changes were made.

(e) The owner/operator shall retain all monitoring records for three years, unless an enforcement action is pending, and then until three years after the enforcement action has been resolved.

(Approved by the Office of Management and Budget under control number 2040-0042)

§ 147.2914 Corrective action for wells authorized by rule.

Based on the Regional Administrator's discretion, corrective action to prevent movement of fluid into a USDW may be required for improperly sealed, completed or abandoned wells (i.e., wells or well bores which may provide and avenue for fluid migration into a USDW) within the zone of endangering influence (as defined in § 147.2904, Area of Review) of an injection well authorized by rule.

(a) EPA will notify the operator when corrective action is required. Corrective action may include:

(1) Well modifications:

(i) Recementing;

(ii) Workover;

(iii) Reconditioning;

(iv) Plugging or replugging;

(2) Limitations on injection pressure to prevent movement of fluid into an USDW;

(3) A more stringent monitoring program; and/or

(4) Periodic testing of other wells to determine if significant movement of fluid has occurred.

(b) If the monitoring discussed in paragraph (a)(3) or (4) of this section indicate the potential endangerment of an USDW, then action as described in paragraph (a)(1) or (2) of this section must be taken.

§ 147.2915 Requiring a permit for wells authorized by rule.

(a) The Regional Administrator may require the owner or operator of any well authorized by rule to apply for an individual or area permit. The Regional Administrator shall notify the owner/operator in writing that a permit application is required. The notice shall contain:

(1) Explanation of need for application;

(2) Application form and, if appropriate, a list of additional information to be submitted; and

(3) Deadline for application submission.

(b) Cases in which the Regional Administrator may require a permit include:

(1) The owner or operator is not in compliance with provisions of the rule;

(2) Injection well is no longer within the category of wells authorized by rule;

(3) Protection of USDW's requires that the injection operation be regulated by requirements which are not contained in the rule; or

(4) Discretion of Regional Administrator.

(c) Injection is no longer authorized by rule upon the effective date of a permit or permit denial, or upon failure of the owner/operator to submit an application in a timely manner as specified in the notice described in paragraph (a) of this section.

(d) Any owner/operator authorized by rule may request to be excluded from the coverage of the rules by applying for an individual or area UIC permit.

§ 147.2916 Coverage of permitting requirements.

The owner or operator of a new Class II injection well or any other Class II well required to have a permit in the Osage Mineral Reserve shall comply with the requirements of §§ 147.2903, 147.2907, 147.2918, through 147.2928.

§ 147.2917 Duration of permits.

Unless otherwise specified in the permit, the permits will be in effect until the well is plugged and abandoned or the permit terminated. The Regional Administrator will review each issued permit at least once every five years to determine whether it should be modified or terminated.

§ 147.2918 Permit application information.

(a) The owner/operator must submit the original and three copies of the permit application, with two complete sets of attachments, to the Osage UIC office. The application should be signed by the owner/operator or a duly authorized representative. The application should also include appropriate forms (i.e., BIA's Application for Operation or Report on Wells and EPA's permit application). The applicant has the burden of proof to show that the proposed injection activities will not endanger USDWs.

(b) The application shall include the information listed below. Information required by paragraphs (b) (5), (7), or (9) of this section that is contained in EPA or BIA files may be included in the application by reference.

(1) Map using township-range sections showing the area of review and identifying all wells of public record penetrating the injection interval.

(2) Tabulation of data on the wells identified in paragraph (b)(1) of this section, including location, depth, date drilled, and record of plugging and/or completion.

(3) Operating data:

(i) Maximum and average injection rate;

(ii) Maximum and average injection pressure;

(iii) Whether operation is on cyclic or continuous operation basis; and

(iv) Source and appropriate analysis of injected fluids, including total dissolved solids, chlorides, and additives.

(4) Geologic data on the injection and confining zones, including faults, geological name, thickness permeability, depth and lithologic description.

(5) Depth to base of fresh water.

(6) Schematic drawings of the surface and subsurface details of the well, showing:

(i) Total depth or plug-back depth;

(ii) Depth to top and bottom of injection interval;

(iii) Depths to tops and bottoms of casing and cemented intervals, and amount of cement to be used;

(iv) Size of casing and tubing, and depth of packer; and

(v) Hole diameter.

(7) Proof that surety bond has been filed with the BIA Superintendent in accordance with 25 CFR 226.6. A surety bond must be maintained until the well has been properly plugged.

(8) Vertification of public notice, consisting of a list showing the names, addresses, and date that notice of permit application was given or sent to:

(i) The surface land owner;

(ii) Tenants on land where injection well is located or proposed to be located; and

(iii) Each operator of a producing lease within one-half mile of the well location.

(9) All available logging and testing data on the well (for existing wells, i.e., wells to be converted or wells previously authorized by rule).

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§ 147.2919 Construction requirements for wells authorized by permit.

(a) All Class II wells shall be sited so that they inject into a formation that is separated from any USDW by a confining zone free of known open faults or fractures within the area of review.

(b) All Class II wells shall be cased and cemented to prevent movement of fluids into or between USDWs. Requirements shall be based on the depth to base of fresh water, and the depth to the injection zone. Newly drilled Class II wells must have surface casing set and cemented to at least 50 feet below the base of fresh water, or the equivalent (e.g., long string cemented to surface). At the Regional Administrator's discretion, the casing and cementing of wells to be converted may be considered adequate if they meet the BIA requirements that were in effect at the time of construction (completion), and will not result in movement of fluid into a USDW.

(c) Owner/operators shall provide a standard female fitting with cut-off valves, connected to the tubing and the tubing/casing annulus so that the injection pressure and annulus pressure may be measured by an EPA representative by attaching a gauge having a standard male fitting.

(d) No owner or operator may begin construction of a new well until a permit authorizing such construction has been issued, unless such construction is otherwise authorized by an area permit.

§ 147.2920 Operating requirements for wells authorized by permit.

(a) For new Class II wells, injection shall be through adequate tubing and packer. Packer shall be run on the tubing and set inside the casing within 75 feet of the top of the injection interval. For existing Class II, wells, injection shall be through adequate tubing and packer, or according to alternative operating requirements approved by the Regional Administrator, as necessary to prevent the movement of fluid into a USDW.

(b) Each well must have mechanical integrity. Mechanical integrity of the injection well must be shown prior to operation. The owner/operator must notify the Osage UIC office at least five days prior to mechanical integrity testing. Conditions of both paragraphs (b) (1) and (2) of this section must be met.

(1) There is no significant leak in the casing, tubing or packer. This may be shown by the following:

(i) Performance of a pressure test of the casing/tubing annulus to at least 200 psi, or the pressure specified by the Regional Administrator, to be repeated thereafter, at five year intervals, for the life of the well (Pressure tests conducted during well operation shall maintain an injection/annulus pressure differential of at least 100 psi throughout the tubing length); or

(ii) Maintaining a positive gauge pressure on the casing/tubing annulus (filled with liquid) and monitoring the pressure monthly and reporting of the pressure information annually; or

(iii) Radioactive tracer survey; or

(iv) For enhanced recovery wells, record of monitoring showing the absence of significant changes in the relationship between injection pressure and injection flow rate at the wellhead, following an initial pressure test as described by paragraph (b)(1) (i) or (v) of this section; or

(v) Testing or monitoring programs approved by the Administrator on a case-by-case basis, and

(2) There is no significant fluid movement into a USDW through vertical channels adjacent to the well bore. This may be shown by any of the following:

(i) Cementing records (need not be reviewed every five years);

(ii) Tracer survey (in appropriate hydrogelogic settings; must be used in conjunction with at least one of the other alternatives);

(iii) Temperature log;

(iv) Noise log; or

(v) Other tests deemed acceptable by the Administrator.

(c) Injection pressure at the wellhead shall be limited so that it does not initiate new fractures or propagate existing fractures in the confining zone adjacent to any UDSW.

(d) Injection wells or projects which have exhibited failure to confine injected fluids to the authorized injection zone or zones may be subject to restriction of injected volume and pressure or shut-in, until the failure has been identified and corrected.

(e) Operation shall not commence until proof has been submitted to the Regional Administrator, or an EPA representative has witnessed that any corrective action specified in the permit has been completed.

§ 147.2921 Schedule of compliance.

The permit may, when appropriate, specify a schedule of compliance leading to compliance with the Safe Drinking Water Act and the Osage UIC regulations.

(a) Any schedule of compliance shall require compliance as soon as possible, and in no case later than three years after the effective date of the permit.

(b) If a permit establishes a schedule of compliance which exceeds one year from the date of permit issuance, the schedule shall set forth interim requirements and the dates for their achievement.

(1) The time between interim dates shall not exceed one year.

(2) If the time necessary for completion of any interim requirement is more than 1 year and is not readily divisible into stages for completion, the permit shall specify interim dates for the submission of reports of progress toward completion of the interim requirements and indicate a projected completion date.

(c) The permit shall be written to require that if a schedule of compliance is applicable, progress reports be submitted no later than 30 days following each interim date and the final date of compliance.

§ 147.2922 Monitoring and reporting requirements for wells authorized by permit.

(a) The owner/operator shall notify the Osage UIC office within 30 days of the date on which injection commenced.

(b) The operator shall monitor the injection pressure (psi) and rate (bbl/day) at least monthly, with the results reported annually. The annual reports shall specify the types or methods used to generate the monitoring data.

(c) The owner/operator shall notify the Osage UIC office within 30 days of any mechanical failure or down-hole problems involving well integrity, well workovers, or any noncompliance. (Operators should note the obligation to apply for and obtain a workover permit from the Bureau of Indian Affairs Osage Agency before reentering an injection well.) If the condition may endanger an USDW, the owner/operator shall notify the Osage UIC officer orally within 24 hours, with written notice including plans for testing and/or repair to be submitted within five days. If all the information is not available within five days, a followup report must be submitted within 30 days.

(d) The owner/operator shall retain all monitoring records for three years, unless an enforcement action is pending, and then until three years after the enforcement action has been resolved.

(e) The owner/operator shall notify the Osage UIC office in writing of a transfer of ownership at least 10 days prior to such transfer.

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§ 147.2923 Corrective action for wells authorized by permit.

All improperly sealed, completed or abandoned wells (i.e., wells or well bores which may provide an avenue for movement of fluid into an UDSW) within the zone of endangering influence (as defined in § 147.2904, Area of Review) that penetrate the injection zone of a Class II well, must have corrective action taken to prevent movement of fluid into a USDW.

(a) EPA will review completion and plugging records of wells within the zone of endangering influence that penetrate the injection zone and will notify the operator when corrective action is required. Corrective action may include:

(1) Well modifications, including:

(i) Recementing;

(ii) Workover;

(iii) Reconditioning; and/or

(iv) Plugging or replugging;

(2) Permit conditions to limit injection pressure so as to prevent movement of fluid into a USDW;

(3) A more stringent monitoring program; and/or

(4) Periodic testing of other wells within the area of review to determine if significant movement of fluid has occurred. If the monitoring discussed in paragraph (a)(3) or (a)(4) of this section indicates the potential endangerment of a USDW, then action as described in paragraph (a)(1) or (a)(2) of this section must be taken.

(b) If the Regional Administrator has demonstrable knowledge that wells within the zone of endangering influence will not serve as conduits for fluid movement into a USDW, the permit may be approved without requiring corrective action. However, additional monitoring shall be required to confirm that no significant migration will occur.

§ 147.2924 Area permits.

(a) Area permits may be issued for more than one injection well if the following conditions are met:

(1) All existing wells are described and located in the permit application;

(2) All wells are within the same well field, project, reservoir or similar unit;

(3) All wells are of similar construction; and

(4) All wells are operated by the same owner/operator.

(b) Area permits shall specify:

(1) The area within which injection is authorized; and

(2) The requirements for construction, monitoring, reporting, operation and abandonment for all wells authorized by the permit.

(c) Area permits can authorize the construction and operation of new wells within the permit area, if:

(1) The permittee notifies the Regional Administrator in the annual report of when and where any new wells have or will be drilled;

(2) The new wells meet the criteria outlined in paragraphs (a) and (b) of this section; and

(3) The effects of the new wells were addressed in the permit application and approved by the Regional Administrator.

(The information collection requirements contained in paragraphs (a)(1) and (c)(1) were approved by the Office of Management and Budget under control number 2040-0042)

§ 147.2925 Standard permit conditions.

(a) The permittee must comply with all permit conditions, except as authorized by an emergency permit (described in § 147.2906). Noncompliance is grounds for permit modification, permit termination or enforcement action.

(b) The permittee has a duty to halt or reduce activity in order to maintain compliance with permit conditions.

(c) The permittee shall take all reasonable steps to mitigate any adverse environmental impact resulting from noncompliance.

(d) The permittee shall properly operate and maintain all facilities installed or used to meet permit conditions. Proper operation and maintenance also includes adequate operator staffing and training, adequate funding, and adequate engineering capability available.

(e) This permit may be modified or terminated for cause (see §§ 147.292 and 147.2928). The filing of a reques by the permittee for a permit modification or termination, or a notificatio of planned changes or anticipated non ompliance, does not stay any permit ondition.

(f) This permit does not convey any roperty rights, or any exclusive privi- ege.

(g) The permittee shall furnish, ithin a reasonable time, information hat the Regional Administrator re- uests, for determination of permit ompliance, or if cause exists, for ermit modification or termination.

(h) The permittee shall allow EPA epresentatives, upon presentation of ppropriate credentials or other docu- nentation, to:

(1) Enter permittee's premises where a regulated activity is conducted or located, or where records required by this permit are kept;

(2) Have access to and copy records required by this permit;

(3) Inspect any facilities, equipment, practices or operations regulated or required by this permit; and

(4) Sample or monitor any substances or parameters at any location for purpose of assuring compliance with this permit or the SDWA.

(i) Monitoring and records.

(1) Samples and monitoring data shall be representative of injection activity.

(2) Permittee shall retain monitoring records for three years.

(3) Monitoring records shall include:

(i) Date, exact place and time of sampling or measurement;

(ii) Individual(s) who preformed the measurements;

(iii) Date(s) analyses were performed;

(iv) Individual(s) who performed the analyses;

(v) Analytical techniques or methods used, including quality assurance techniques employed to insure the generation of reliable data; and

(vi) Results of analyses.

(j) *Signatory requirements.* All applications, reports or information submitted to the Regional Administrator or the Osage UIC office must be signed by the injection facility owner/operator or his duly authorized representative. The person signing these documents must make the following certification:

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

(k) *Reporting requirements.* (1) The permittee shall notify the Regional Administrator as soon as possible of any planned changes to the facility.

(2) The permittee shall give advance notice to the Regional Administrator of any planned changes which may result in noncompliance.

(3) This permit is not transferable to any person except after notice to the Regional Administrator in accordance with § 147.2926.

(l) A new injection well shall not commence injection until construction is complete and the Regional Administrator has been notified of completion of construction and has given his approval to commence injection.

(The information collection requirements contained in paragraphs (g) and (i) were approved by the Office of Management and Budget under control number 2040–0042)

§ 147.2926 Permit transfers.

(a) Permits may be transferred to another permittee:

(1) If the current permittee notifies the Regional Administrator at least 10 days before the proposed transfer date; and

(2) If the notice includes a written agreement between the existing and new permittees containing:

(i) A specific date for transfer of permit responsibility, coverage and liability; and

(ii) Assurance that the new permittee has a surety bond on file with BIA; and

(3) If the Regional Administrator does not respond with a notice to the existing permittee that the permit will be modified.

(b) If the conditions in paragraph (a) of this section are met, the transfer is effective on the date specified in paragraph (a)(2)(i) of this section.

(Approved by the Office of Management and Budget under control number 2040–0042)

§ 147.2927 Permit modification.

(a) Permits may be modified for the following causes only (with the exceptions listed in paragraph (b) of this section regarding minor modifications):

(1) There are substantial changes to the facility or activity which occurred after permit issuance that justify revised or additional permit conditions.

(2) The Regional Administrator has received information (e.g., from monitoring reports, inspections) which warrants a modified permit.

(3) The regulations or standards on which the permit was based have changed.

(4) The Regional Administrator has received notice of a proposed permit transfer.

(5) An interested person requests in writing that a permit be modified, and the Regional Administrator determines that cause for modification exists.

(6) Cause exists for termination under § 147.2928, but the Regional Administrator determines that permit modification is appropriate.

(b) *Minor modifications.* (1) Minor modifications do not require that the procedures listed in paragraph (c) of this section be followed.

(2) Minor modifications consist of:

(i) Correcting typographical errors;

(ii) Requiring more frequent monitoring or reporting;

(iii) Changing ownership or operational control (see § 147.2926, Permit Transfers); or

(iv) Changing quantities or types of injected fluids, provided:

(A) The facility can operate within conditions of permit;

(B) The facility classification would not change.

(c) *Modification procedures.* (1) A draft permit shall be prepared with proposed modifications.

(2) The draft permit shall follow the general permitting procedures (i.e., public comment period, etc.) before a final decision is made.

(3) Only the changed conditions shall be addressed in the draft permit or public review.

§ 147.2928 Permit termination.

(a) Permits may be terminated for the following causes only:

(1) Noncompliance with any permit condition.

(2) Misrepresentation or failure to fully disclose any relevant facts.

(3) Determination that the permitted activity endangers human health or the environment.

(4) Interested person requests in writing that a permit be terminated and the Regional Administrator determines that request is valid.

(b) *Termination procedures.* (1) The Regional Administrator shall issue notice of intent to terminate (which is a type of draft permit).

(2) Notice of intent to terminate shall follow the general permitting procedures (i.e., public comment period, etc.) before a final decision is made.

§ 147.2929 Administrative permitting procedures.

(a) *Completeness review.* (1) The Regional Administrator shall review each permit application for completeness with the application requirements in § 147.2918. The review will be completed in 10 days, and the Regional Administrator shall notify the applicant whether or not the application is complete.

(2) If the application is incomplete, the Regional Administrator shall:

(i) List the additional information needed;

(ii) Specify a date by which the information must be submitted; and

(iii) Notify the applicant when the application is complete.

(3) After an application is determined complete, the Regional Administrator may request additional information to clarify previously submitted information. The application will still be considered complete.

(4) If an applicant fails or refuses to correct deficiencies in the application, the permit may be denied and appropriate enforcement actions taken.

(b) *Draft permits.* (1) After an application is deemed complete, the Regional Administrator shall either prepare a draft permit or notice of intent to deny the permit (which is a type of

aft permit). If the Regional Admin-
rator later decides the tentative de-
sion to deny was wrong, he shall
thdraw the notice of intent to deny
d prepare a draft permit.

(2) A draft permit shall contain at
ast the following information:

(i) The standard permit conditions
§ 147.2925;

(ii) Any monitoring and reporting re-
uirements;

(iii) The construction and operation
equirements; and

(iv) Plugging and abandonment re-
uirements.

(c) *Statement of basis.* (1) The Re-
ional Administrator shall prepare a
atement of basis for every draft
ermit.

(2) The statement of basis shall
riefly describe the draft permit con-
itions and the reasons for them. In
he case of a notice of intent to deny
r terminate, the statement of basis
hall give reasons to support the ten-
ative decision.

(3) The statement of basis shall be
ent to the applicant, and to any other
erson who requests a copy.

(d) *Public notice.* (1)(i) The Regional Administrator shall give public notice when:

(A) A permit application has been tentatively denied;

(B) A draft permit has been prepared;

(C) A hearing has been scheduled; or

(D) An appeal has been granted.

(ii) The applicant shall give public notice that he is submitting a permit application.

(iii) Public notice is not required when a request for permit modification or termination is denied. However, written notice will be given to the permittee and the requester.

(iv) Public notices may include more than one permit or action.

(2)(i) Public notice of a draft permit (including notice of intent to deny) shall allow at least 15 days for public comment.

(ii) Public notice of a hearing shall be given at least 30 days before the hearing.

(3)(i) Public notice given by the Regional Administrator for the reasons listed in paragraph (d)(1)(i) of this section shall be mailed to the applicant and published in a daily or weekly paper of general circulation in the affected area.

(ii) Notice of application submission required by paragraph (d)(1)(ii) of this section shall be given to the surface landowner, tenants on the land where an injection well is located or is proposed to be located, and to each operator of a producing lease within one-half mile of the well location prior to submitting the application to the Regional Administrator.

(4) The notice of application submission in paragraphs (d)(1)(ii) and (d)(3)(ii) of this section shall contain:

(i) The applicant's name and address;

(ii) The legal location of the injection well;

(iii) Nature of activity;

(iv) A statement that EPA will be preparing a draft permit and that there will be an opportunity for public comment; and

(v) The name and phone number of EPA contact person.

(5) All other notices shall contain:

(i) The name, address, and phone number of the Osage UIC office and contact person for additional information and copies of the draft permit;

(ii) Name and address of permit applicant or permittee;

(iii) Brief description of nature of activity;

(iv) Brief description of comment period and comment procedures;

(v) Location of the information available for public review; and

(vi) In the case of a notice for a hearing the notice shall also include:

(A) Date, time, and location of hearing;

(B) Reference to date of previous notices of the same permit; and

(C) Brief description of the purpose of the hearing, including rules and procedures.

(e) *Public comments.* (1) During the public comment period, any person may submit written comments on the draft permit, and may request a public hearing. A request for hearing shall be in writing and state the issues proposed to be raised in the hearing.

(2) The Regional Administrator shall consider all comments when making the final decision, and shall re-

spond to comments after the decision is made. The response shall:

(i) Specify if any changes were made from the draft permit to the final permit decision, and why;

(ii) Briefly describe and respond to all significant comments on the draft permit made during the comment period, or hearing, if held; and

(iii) Be made available to the public.

(f) *Public hearings.* (1) The Regional Administrator shall hold a public hearing whenever he finds a significant amount of public interest in a draft permit, based on the requests submitted, or at his discretion.

(2) Any person may submit oral or written statements and data concerning the draft permit. The public comment period shall be automatically extended to the close of any public hearing held, or may be extended by the hearing officer at the hearing.

(3) A tape recording or written transcript of the hearing shall be made available to the public.

(g) *Reopening of the comment period.*

(1) If any of the information submitted during the public comment period raises substantial new questions about a permit, the Regional Administrator may:

(i) Prepare a new draft permit;

(ii) Prepare a revised statement of basis; or

(iii) Reopen the comment period.

(2) Comments submitted during a reopened comment period shall be limited to the substantial new questions that caused its reopening.

(3) Public notice about any of the above actions shall be given and shall define the scope of the new questions raised.

(h) *Issuance and effective date of a permit.* (1) After the close of the comment period on a draft permit, the Regional Administrator shall make a final permit decision. The Regional Administrator shall notify the applicant and each person who commented or requested to receive notice. The notice shall include reference to the procedures for appealing a permit decision.

(2) A final permit decision shall become effective 30 days after giving notice of the decision unless:

(i) A later date is specified in the notice;

(ii) Review is requested under § 147.2929(j); or

(iii) No comments requested a change in the draft permit, in which case the permit is effective immediately upon issuance.

(i) *Stays of contested permit conditions.* If a request for review of a final UIC permit § 147.2929(j) is granted, the effect of the contested permit conditions shall be stayed and shall not be subject to judicial review pending final agency action. If the permit involves a new injection well or project, the applicant shall be without a permit for the proposed well pending final agency action. Uncontested provisions which are not severable from those contested provisions shall be stayed with the contested provisions.

(j) *Appeal of permits.* (1) Any person who filed comments on the draft permit or participated in the public hearing may petition the Administrator to review any condition of the permit decision. Any person who failed to file comments or participate in the hearing may petition for administrative review only to the extent of the changes from the preliminary permit to the final permit decision.

(2) A person may request review of a final permit decision within 30 days after a final permit decision has been issued. The 30-day period within which a person may request review begins with the service of notice of the Regional Administrator's final permit decision unless a later date is specified in that notice.

(3) The petition requesting review shall include:

(i) A demonstration that the petitioner is eligible under the requirements of paragraph (j)(1) of this section; and when appropriate,

(ii) A showing that the condition in question is based on:

(A) A finding of fact or conclusion of law that is clearly erroneous; or

(B) An exercise of discretion or important policy consideration which the Administrator, in his discretion should review.

(4) The Administrator may also decide, on his initiative, to review any condition of any UIC permit issued

under these requirements. The Administrator must act under this paragraph within 30 days of the date notice was given of the Regional Administrator's action.

(5) Within a reasonable time following the filing of the petition for review, the Administrator shall issue an order either granting or denying the request. To the extent that review is denied, the conditions of the final permit decision become final agency action.

(6) Public notice shall be given by the Regional Administrator of any grant of a review petition by the Administrator. Notice shall be sent to the applicant, the person requesting the review, appropriate persons on the Osage County mailing list and to newspapers of general circulation in the county. Included in the notice shall be a briefing schedule for the appeal and a statement that any interested person may file an amicus brief. Notice of denial of the review petition will be sent only to the person(s) requesting the review.

(7) A petition to the Administrator, under paragraphs (j) (1) and (2) of this section is a prerequisite to the seeking of judicial review of the final agency action. For purposes of judicial review, final agency action occurs when a final UIC permit is issued or denied by the Regional Administrator and agency review procedures are exhausted. A final permit decision shall be issued by the Regional Administrator:

(i) When the Administrator issues notice to the parties involved that review has been denied;

(ii) When the Administrator issues a decision on the merits of the appeal and the decision does not include a remand of the proceedings; or

(iii) Upon the completion of the remand proceedings if the proceedings are remanded, unless the Administrator's remand order specifically provides that the appeal of the remand decision will be required to exhaust the administrative remedies.

(The information collection requirements contained in paragraph (a)(3) were approved by the Office of Management and Budget under control number 2040-0042)

Subpart HHH—Lands of the Navajo, Ute Mountain Ute, and All Other New Mexico Tribes

Source: 53 FR 43104, Oct. 25, 1988, unless otherwise noted.

§ 147.3000 EPA-administered program.

(a) *Contents.* The UIC program for the Indian lands of the Navajo, the Ute Mountain Ute (Class II wells only on Ute Mountain Ute lands in Colorado and all wells on Ute Mountain Ute lands in Utah and New Mexico), and all wells on other Indian lands in New Mexico is administered by EPA. (The term "Indian lands" is defined at 40 CFR 144.3.) The Navajo Indian lands are in the States of Arizona, New Mexico and Utah; and the Ute Mountain Ute lands are in Colorado, New Mexico and Utah. This program consists of the UIC program requirements of 40 CFR Parts 124, 144, and 146 and additional requirements set forth in the remainder of this subpart. The additions and modifications of this subpart apply only to the Indian lands described above. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date for the UIC program on these lands is November 25, 1988.

§ 147.3001 Definition.

Area of review. For the purposes of this subpart, area of review means the area surrounding an injection well or project area described according to the criteria set forth in § 147.3009 of this subpart.

§ 147.3002 Public notice of permit actions.

An applicant shall give public notice of his intention to apply for a permit as follows:

(a) Prior to submitting an application to the Director, the applicant shall give notice to each landowner, tenant, and operator of a producing lease within one-half mile of the well and to the affected Tribal Government. The notice shall include:

(1) Name and address of applicant;

(2) A brief description of the planned injection activities including well location, name and depth of the

best copy available

injection zone, maximum injection pressure and volume, and source and description of the fluid to be injected;

(3) Name, address, and phone number of the EPA contact person; and

(4) A statement that opportunity to comment will be announced to the public after EPA prepares a draft permit.

(b) In addition to the requirements of § 144.31(e) of this chapter, a permit applicant shall submit a description of the way the notice was given and the names and addresses of those to whom it was given.

(c) Upon written request and supporting documentation, the Director may waive the requirement in paragraph (a) of this section to give individual notice of intent to apply for permits in an area where it would be impractical. However, notice to the affected Tribal government shall not be waived.

(d) The Director shall also provide to the affected Tribal government all notices given to State governments under § 124.10(c) of this chapter.

§ 147.3003 Aquifer exemptions.

(a) *Aquifer exemptions in connection with Class II wells.* In accordance with § 144.7(b) and § 146.4 of this chapter, the portions of authorized injection zones into which existing Class II wells are currently injecting which are described in Appendix A are hereby exempted. The exempted aquifers are defined by a one-quarter mile radius from the existing injection well. The exemption includes the intended injection zone only and is solely for the purpose of Class II injection.

(b) *Class III wells.* In addition to the requirements of § 144.7(c)(1) of this chapter, an applicant for a uranium mining permit which necessitates an aquifer exemption shall submit a plugging and abandonment plan containing an aquifer cleanup plan, acceptable to the Director, describing the methods or techniques that will be used to meet the standards of § 147.3011. The cleanup plan shall include an analysis of pre-injection water quality for the constituents required by the Director. The Director shall consider the cleanup plan in addition to the other information required for permit applications under §§ 144.31(e) and 146.34 of this chapter.

§ 147.3004 Duration of rule authorization for existing Class I and III wells.

Notwithstanding § 144.21(a)(3)(i)(B) of this chapter, authorization by rule for existing Class I and III wells will expire 90 days after the effective date of this UIC program unless a complete permit application has been submitted to the Director.

§ 147.3005 Radioactive waste injection wells.

Notwithstanding §§ 144.24 an 146.51(b) of this chapter, owners an operators of wells used to dispose o radioactive waste (as defined in 1 CFR Part 20, Appendix B, Table II but not including high level and trans uranic waste and spent nuclear fue covered by 40 CFR Part 191) shal comply with the permitting require ments pertaining to Class I wells i Parts 124, 144 and 146 of this chapte as modified and supplemented by thi subpart.

§ 147.3006 Injection pressure for existin Class II wells authorized by rule.

(a) *Rule-authorized Class II sal water disposal wells.* In addition to th requirements of § 144.28(f)(3)(ii) this chapter, the owner or operato shall, except during well stimulatio use an injection pressure measured the wellhead that is not greater tha the pressure calculated by using th following formula: Pm=0.2d

where:

Pm=injection pressure at the wellhead pounds per square inch

d=depth in feet to the top of the injecti zone.

Owners and operators shall comp with this requirement no later th one year after the effective date this program.

(b) *Rule-authorized Class II e hanced recovery and hydrocarbon st age wells.* (1) In addition to the quirements of § 144.28(f)(3)(ii) of th chapter, owners and operators sh use an injection pressure no great than the pressure established by t Director for the field or formation which the well is located. The Director shall establish such maximum pressure after notice (including notice to the affected Tribe), opportunity for comment, and opportunity for public hearing according to the provisions of Part 124, Subpart A, of this chapter, and shall inform owners and operators and the affected Tribe in writing of the applicable maximum pressure; or

(2) An owner or operator may inject at a pressure greater than that specified in paragraph (b)(1) of this section for the field or formation in which he is operating after demonstrating in writing to the satisfaction of the Director that such injection pressure will not violate the requirements of § 144.28(f)(3)(ii) of this chapter. The Director may grant such a request after notice (including notice to the affected Tribe), opportunity for comment and opportunity for a public hearing according to the provisions of Part 124, Subpart A of this chapter.

(3) Prior to the time that the Director establishes rules for maximum injection pressure under paragraph (b)(1) of this section the owner or operator shall:

(i) Limit injection pressure to a value which will not exceed the operating requirements of § 144.28(f)(3)(ii); and

(ii) Submit data acceptable to the Director which defines the fracture pressure of the formation in which injection is taking place. A single submission may be made on behalf of two or more operators conducting operations in the same field and formation, if the Director approves. The data shall be submitted to the Director within one year of the effective date of this program.

§ 147.3007 Application for a permit.

(a) Notwithstanding the requirements of § 144.31(c)(1) of this chapter, the owner or operator of an existing Class I or III well shall submit a complete permit application no later than 90 days after the effective date of the program.

(b) The topographic map (or other map if a topographic map is unavailable) required by § 144.31(e)(7) of this chapter, shall extend two miles from Class II wells, and 2½ miles from Class I and III wells. These maps will show all the information listed in paragraph 144.31(e)(7) within ½ mile for Class II wells and 2½ miles for Class I and III wells.

§ 147.3008 Criteria for aquifer exemptions.

The aquifer exemption criterion in § 146.4(c) of this chapter shall not be available for this program.

§ 147.3009 Area of review.

The area of review shall be defined as follows:

(a) *Class II wells.* The area of review for Class II permits and area permits shall be defined by a fixed radius as described in § 146.6(b) (1) and (2) of this chapter except that the radius shall be one-half mile.

(b) *Class I and III wells.* The area of review for Class I and III wells are well fields which may be either:

(1) An area defined by a radius two and one-half miles from the well or well field; or

(2) An area one-quarter mile from the well or well field where the well field production at the times exceeds injection to produce a net withdrawal; or

(3) A suitable distance, not less than one-quarter mile, proposed by the owner or operator and approved by the Director based upon a mathematical calculation such as that found in § 146.6(a)(2) of this chapter.

§§ 147.3010 Mechanical integrity tests.

The monitoring of annulus pressure listed in 146.8(b)(1) of this chapter will only be acceptable if preceded by a pressure test, using liquid or gas that clearly demonstrates that mechanical integrity exists at the time of the pressure test.

§ 147.3011 Plugging and abandonment of Class III wells.

To meet the requirements of paragraph 146.10 (d) of this chapter, owners and operators of Class III uranium projects underlying or in aquifers containing up to 5,000 mg/l TDS which have been exempted under § 146.4 of this chapter shall:

(a) Include in the required plugging and abandonment plan a plan for aquifer clean-up and monitoring which demonstrates adequate protection of surrounding USDWs.

(1) The Director shall include in each such permit for a Class III uranium project the concentrations of contaminants to which aquifers must be cleaned up in order to protect surrounding USDWs.

(2) The concentrations will be set as close as is feasible to the original conditions.

(b) When requesting permission to plug a well, owners and operators shall submit for the Director's approval a schedule for the proposed aquifer cleanup, in addition to the information required by § 146.34(c).

(c) Cleanup and monitoring shall be continued until the owner or operator certifies that no constituent listed in the permit exceeds the concentrations required by the permit, and the Director notifies the permittee in writing that cleanup activity may be terminated.

§ 147.3012 Construction requirements for Class I wells.

In addition to the cementing requirement of § 146.12(b) of this chapter, owners and operators of Class I wells shall, through circulation, cement all casing to the surface.

§ 147.3013 Information to be considered for Class I wells.

(a) In addition to the information listed in § 146.14(a) of this chapter, the Director shall consider the following prior to issuing any Class I permit:

(1) Expected pressure changes, native fluid displacement, and direction of movement of the injected fluid; and

(2) Methods to be used for sampling, and for measurement and calculation of flow.

(b) In addition to the information listed in § 146.14(b) of this chapter, the Director shall consider any information required under § 146.14(a) of this chapter (as supplemented by this subpart) that has been gathered during construction.

§ 147.3014 Construction requirements for Class III wells.

(a) In addition to the requirements of § 146.32(c)(3) of this chapter, radiological characteristics of the formation fluids shall be provided to the Director.

(b) In addition to the requirements of § 146.32(e) of this chapter, the Director may require monitoring wells to be completed into USDWs below the injection zone if those USDWs may be affected by mining operations.

§ 147.3015 Information to be considered for Class III wells.

(a) In addition to the requirement
of § 146.34(a) of this chapter, the fol
lowing information shall be considere
by the Director:

(1) Proposed construction proce
dures, including a cementing an
casing program, logging procedure
deviation checks, and a drilling, tes
ing and coring program.

(2) Depth to the proposed injectio
zone, and a chemical, physical and r
diological analysis of the ground wat
in the proposed injection zone suf
cient to define pre-injection wat
quality as required for aquifer clean
by § 147.3011 of this subpart.

(3) An aquifer cleanup plan if r
quired by § 147.3003(b) of this subpa

(4) Any additional information th
may be necessary to demonstrate th
cleanup will reduce the level of co
taminants in the surrounding USD
as close as feasible to the original co
ditions.

(b) In addition to the requiremen
of § 146.34(b) of this chapter, the
rector shall consider any informati
required under § 146.34(a) of t
chapter (as supplemented by this s
part) that has been gathered dur
construction.

§ 147.3016 Criteria and standards appl ble to Class V wells.

In addition to the criteria and sta
ards applicable to Class V wells
forth in Subpart F of Part 146 of
chapter, owners and operators of w
that do not fall within the Class
category but that are used to disp
of radioactive wastes (as defined i
CFR Part 20, Appendix B, Tabl

Column 2, but not including high level and transuranic wastes and spent nuclear fuel covered by 40 CFR Part 191) shall comply with all of the requirements applicable to Class I injection wells in 40 CFR Parts 124, 144 and 146 as supplemented by this subpart.

APPENDIX A TO SUBPART HHH—EXEMPTED AQUIFERS IN NEW MEXICO

The areas described by a one-quarter mile radius around the following Class II wells in the listed formations are exempted for the purpose of Class II injection.

	Sec.					Well No.
Arco Oil & Gas Co.—Operator/Horseshoe Gallup—Field/Gallup—Formation						
SE/NE	5	T30N	R16W	1650'FNL	330'FEL	134
NW/NW	30	T31N	R16W	660'FNL	703'FWL	8
SE/SW	28	T31N	R16W	790'FSL	2150'FWL	167
NW/SE	33	T31N	R16W	1710'FSL	2310'FEL	199
SE/NW	35	T31N	R16W	2105'FNL	2105'FWL	196
NW/NW	4	T30N	R16W	455'FNL	4435'FEL	219
NW/SW	33	T31N	R16W	1980'FSL	386'FWL	65
NW/SE	27	T31N	R16W	1980'FSL	2080'FEL	164
SE/SE	30	T31N	R16W	660'FSL	660'FEL	5
NW/NW	34	T31N	R16W	730'FNL	515'FWL	180
NW/NE	34	T31N	R16W	813'FNL	2036'FEL	182
NW/NE	2	T30N	R16W	720'FNL	2040'FEL	229
NW/NW	29	T31N	R16W	660'FNL	660'FWL	24
NW/SW	13	T31N	R17W	1975'FSL	670'FWL	77
NW/SE	29	T31N	R16W	1980'FSL	1980'FEL	22
SE/SW	27	T31N	R16W	660'FSL	1980'FWL	171
NW/SW	35	T31N	R16W	1980'FSL	660'FWL	205
SE/NW	30	T31N	R16W	1980'FNL	2061'FWL	7
NW/NE	31	T31N	R16W	660'FNL	1980'FEL	17
NW/NE	4	T30N	R16W	330'FNL	2160'FEL	221
NW/NE	29	T31N	R16W	660'FNL	1980'FEL	26
SE/NE	34	T31N	R16W	1990'FNL	645'FEL	194
SE/SE	31	T31N	R16W	640'FSL	660'FEL	27
NE/SW	14	T31N	R17W	2250'FSL	2630'FWL	94
NE/NW	14	T31N	R17W	625'FNL	1995'FWI,	69
SE/NW	10	T30N	R16W	1900'FNL	2080'FWL	271
SE/SE	29	T31N	R16W	560'FSL		21
SE/NE	30	T31N	R16W	1980'FNL	660'FEL	10
SE/NW	29	T31N	R16W	2080'FNL	1980'FWL	23
NW/SE	25	T31N	R17W	1980'FSL	1980'FEL	122
SE/SW	32	T31N	R16W	660'FSL	1980'FWL	14
NW/SW	30	T31N	R16W	2021'FSL	742'FWL	19
SE/SW	13	T31N	R17W	660'FSL	1980'FWL	82
NW/NW	27	T31N	R16W	520'FNL	660'FWL	150
SE/SE	28	T31N	R16W	660'FSL	660'FEL	169
NW/SW	29	T31N	R16W	1980'FSL	660'FWL	11
SE/NW	34	T31N	R16W	2310'FNL	1650'FWL	192
SE/NW	29	T31N	R16W	660'FSL	1980'FWL	12
NW/SW	27	T31N	R16W	1650'FSL	330'FWL	162
NE/SE	23	T31N	R17W	1880'FSL	340'FEL	96
NW/SW	24	T31N	R17W	2050'FSL	990'FWL	97
SE/NW	4	T30N	R16W	2060'FNL	1710'FWL	232
NW/NW	31	T31N	R16W	620'FNL	701'FWL	30
	35	T31N	R16W	1980'FSL	1980'FEL	207

SE/NE	32	T31N	R16W	1980'FNL	417'FEL	20
NE/NW	28	T31N	R16W	1980'FNL	1980'FEL	152
NE/NW	34	T31N	R16W	2140'FSL	735'FWL	201
SE/NW	3	T30N	R16W	2310'FNL	1640'FWL	236
SE/SW	34	T31N	R16W	660'FSL	1980'FWL	213
NW/NE	30	T31N	R16W	660'FNL	1980'FFL	9
SE/SW	26	T31N	R16W	660'FSL	1980'FWL	175
NW/SE	30	T31N	R16W	1980'FSL	1980'FEL	6
SE/NW	9	T30N	R16W	1650'FNL	2131'FWL	264
NW/SW	4	T30N	R16W	2310'FSL	4390'FEL	242
NW/SW	2	T30N	R16W	1980'FSL	660'FWL	250
NW/NW	33	T31N	R16W	660'FNL	386'FWL	66
NE/NE	15	T31N	R17W	660'FNL	660'FEL	67
NW/NE	33	T31N	R16W	660'FNL	1980'FEL	178
NW/SE	24	T31N	R17W	1875'FSL	1900'FEL	99
NW/NE	28	T31N	R16W	660'FNL	1980'FEL	148
NW/NW	19	T31N	R16W	660'FNL	682'FWL	89
NW/SE	4	T30N	R16W	1820'FSL	2130'FEL	244
SE/SW	20	T31N	R16W	660'FSL	1980'FWL	115
NW/NE	25	T31N	R17W	660'FNL	1980'FEL	118
SE/SW	4	T30N	R16W	660'FSL	3300'FEL	253
NW/SW	19	T31N	R16W	1980'FSL	706'FWL	101
NW/SE	32	T31N	R16W	1950'FSL	1980'FEL	22
NW/NW	35	T31N	R16W	605'FNL	690'FWL	184
SE/NE	29	T31N	R16W	1980'FNL	417'FEL	25
SE/NW	19	T31N	R16W	1980'FNL	2023'FWL	95
NW/NW	32	T31N	R16W	660'FNL	660'FWL	4
SE/SW	24	T31N	R17W	660'FSL	3300'FEL	107
SE/NE	28	T31N	R16W	2105'FNL	940'FEL	154
NW/NE	35	T31N	R16W	610'FNL	2000'FEL	186
SE/SW	5	T31N	R16W	990'FSL	2310'FWL	139
NW/SE	28	T31N	R16W	1980'FSL	1980'FEL	160
SE/SE	33	T31N	R16W	330'FSL	990'FEL	211
NW/NE	5	T30N	R16W	330'FNL	1650'FEL	128
SE/NW	27	T31N	R16W	1900'FNL	2050'FWL	156
SE/SW	35	T31N	R16W	660'FSL	1980'FWL	217
NW/NW	10	T30N	R16W	526'FNL	330'FWL	265
NE/SW	21	T31N	R16W	1880'FSL	1980'FWL	143
NW/NE	24	T31N	R17W	409'FNL	1914'FEL	87
NW/SW	32	T31N	R16W	1980'FSL	660'FWL	15
SE/SE	34	T31N	R16W	960'FSL	910'FEL	215
SW/SE	21	T31N	R16W	820'FSL	1820'FEL	145
SE/SE	27	T31N	R16W	610'FSL	640'FEL	173
NW/SW	3	T30N	R16W	1920'FSL	350'FWL	246
SE/SW	19	T31N	R16W	601'FSL	2002'FWL	111
SW/SE	14	T31N	R17W	330'FSL	1900'FEL	79
NW/NW	27	T31N	R16W	520'FNL	660'FWL	150
SE/NW	31	T31N	R16W	1724'FNL	2067'FWL	29

	Sec.					Well No.
NW/NE	32	T31N	R16W	660'FNL	1980'FEL	13
SE/NE	24	T31N	R17W	1998'FNL	702'FEL	93
NW/NW	5	T30N	R16W	660'FNL	660'FWL	126
NW/SW	28	T31N	R16W	1740'FSL	590'FWL	158
SE/NE	31	T31N	R16W	1980'FNL	660'FEL	16
NW/NW	24	T31N	R17W	660'FNL	760'FWL	85
Energy Reserve Backup Inc.—Operator/Horseshoe Gallup—Field/Gallup—Formation						
SE/SE	5	T31N	R17W	660'FSL	660'FEL	4
NE/SW	10	T30N	R16W	1970'FSL	2210'FWL	31
SE/NW	11	T30N	R16W	2090'FNL	2190'FWl	29
SE/SE	10	T30N	R16W	700'FSL	500'FEL	37
Solar Petroelum Inc.—Operator/Horseshoe—Field/Gallup—Formation						
SW/SE	11	T31N	R17W	736'FSL	2045'FEL	205
SE/NE	9	T31N	R17W	1980'FNL	660'FEL	122
NW/SE	4	T31N	R17W	1980'FSL	1980'FFL	127
NE/NE	10	T31N	R17W	660'FNL	660'FEL	136
SE/SW	4	T31N	R17W	660'FSL	1980'FWL	125
SW/NW	11	T31N	R17W	2300'FNL	660'FWL	206
NW/SW	4	T31N	R17W	1980'FSL	660'FWL	103
SE/NW	4	T31N	R17W	1989'FNL	1980'FWL	128
NW/NW	4	T31N	R17W	660'FNL	660'FWL	101
SW/NE	10	T31N	R17W	1980'FNL	1980'FEL	117
SW/NW	10	T31N	R17W	1980'FNL	660'FWL	108
SW/SW	10	T31N	R17W	660'FSL	660'FWL	114
SW/SE	3	T31N	R17W	330'FSL	2310'FEL	143
SE/NE	5	T31N	R17W	1980'FNL	660'FEL	302
NE/NE	5	T31N	R17W	1950'FNL	1050'FEL	307
SE/SE	9	T31N	R17W	990'FSL	850'FEL	140
NE/NW	10	T31N	R17W	660'FNL	1980'FWL	118
SW/SW	11	T31N	R17W	660'FSL	660'FWL	204
NW/SE	9	T31N	R17W	1980'FSL	1980'FEL	115
SW/SE	10	T31N	R17W	990'FSL	1980'FEL	144
NW/NE	9	T31N	R17W	660'FNL	1980'FEL	123
NE/SW	10	T31N	R17W	1980'FSL	1980'FWL	109
NE/SW	11	T31N	R17W	1980'FSL	1980'FWL	203
SE/NW	9	T31N	R17W	1980'FNL	1980'FWL	134
NW/SW	3	T31N	R17W	1980'FSL	660'FWL	132
SW/SW	3	T31N	R17W	560'FSL	660'FWL	110
NW/NW	9	T31N	R16W	660'FNL	660'FWL	133
SE/SE	4	T31N	R17W	660'FSL	660'FEL	124

WTR Oil Co.—Operator/Horseshoe Gallup—Field/Gallup—Formation						
NE/SW	33	T32N	R17W	1980'FSL	1989'FWL	2
Arco Oil & Gas Co.—Operator/Many Rocks Gallup—Field/Gallup—Formation						
NW/NW	7	T31N	R16W	898'FNL	500'FWL	2
SW/NE	17	T31N	R16W	1673'FNL	1789'FEL	21
NW/SE	17	T31N	R16W	1890'FSL	2150'FEL	23
SW/NE	7	T31N	R16W	2310'FNL	2310'FEL	6
NE/SW	8	T31N	R16W	1650'FSL	1650'FWL	12
NE/NW	17	T31N	R16W	660'FNL	2030'FWL	18
NE/NE	18	T31N	R16W	360'FNL	855'FEL	16
SE/SW	7	T31N	R16W	716'FSL	2185'FWL	13
SE/SE	17	T31N	R16W	660'FSL	660'FEL	26
NE/SW	17	T31N	R16W	2040'FSL	2070'FWL	22
SW/SW	6	T31N	R16W	330'FSL	330'FWL	1
SW/NW	17	T31N	R16W	2073'FNL	641'FWL	19
NW/SW	17	T31N	R16W	1967'FSL	981'FWL	8
James P. Woosley—Operator/Many Rocks Gallup—Field/Gallup—Formation						
NW/NE	20	T32N	R17W	330'FNL	2310'FEL	13
SW/SW	27	T32N	R17W	660'FSL	990'FWL	1
SW/NW	17	T32N	R17W	2310'FWL	330'FWL	4
SW/NW	27	T32N	R17W	260'FWL	1360'FNL	11
NE/SW	27	T32N	R17W	1980'FSL	1980'FWL	6
NE/SE	18	T32N	R17W	2474'FSL	133'FEL	18
SW/SE	27	T32N	R17W	625'FNL	2000'FEL	3
NE/SE	28	T32N	R17W	1980'FSL	330'FEL	12
Solar Petroleum Inc.—Operator/Many Rocks Gallup—Field/Gallup—Formation						
SE/NW	1	T31N	R17W	1980'FNL	1980'FWL	216
NW/NE	2	T31N	R17W	805'FNL	940'FEL	215
SE/NE	2	T31N	R17W	1980'FNL	660'FEL	218
NW/SW	1	T31N	R17W	2310'FSL	990'FNL	223
SE/NE	12	T31N	R17W	1820'FNL	500'FEL	217
WTR Oil Co.—Operator/Many Rocks Gallup—Field/Gallup—Formation						
NW/NW	35	T32N	R17W	810'FNL	510'FWL	11
SE/SE	35	T32N	R17W	660'FSL	660'FEL	6
SE/NE	34	T32N	R17W	775'FEL	1980'FNL	8
SE/NW	35	T32N	R16W	1980'FNL	1980'FWL	9
NW/SE	35	T32N	R17W	1980'FSL	1980'FEL	7

	Sec.					Well No.
Chaco Oil Co.—Operator/Red Mtn Mesaverde—Field/Menefee—Formation						
NE/NE	29	T20N	R9W	395'FNL	1265'FEL	6
SE/SW	20	T20N	R9W	442'FSL	2430'FWL	17
Geo Engineering Inc.—Operator/Red Mtn Mesaverde—Field/Menefee—Formation						
NW/NE	29	T20N	R9W	160'FNL	2135'FEL	35
NE/NE	29	T20N	R9W	225'FNL	1265'FEL	7
SE/NW	29	T20N	R9W	1344'FNL	2555'FWL	20
NW/NE	29	T20N	R9W	615'FNL	1920'FEL	5
NE/NW	29	T20N	R9W	834'FNL	2113'FWL	21
SW/SE	20	T20N	R9W	265'FSL	2150'FEL	36
NE/NE	29	T20N	R9W	5'FNL	1130'FEL	8
SE/SE	20	T20N	R9W	450'FSL	1145'FEL	24
SE/SE	20	T20N	R9W	990'FSL	1280'FEL	10
NW/NE	29	T20N	R9W	1115'FNL	2325'FEL	22
SE/SE	20	T20N	R9W	1085'FSL	860'FEL	12
Tesoro Petroleum Co.—Operator/S. Hospah Lower Sand—Field/Hospah—Formation						
NW/SE	6	T17N	R8W	2310'FSL	2310'FEL	28
SW/SE	6	T17N	R8W	990'FSL	2310'FFL	34
SW/SW	6	T17N	R8W	5'FSL	20'FWL	18
SE/SW	6	T17N	R8W	5'FSL	2635'FWL	20

Subpart III—Lands of Certain Oklahoma Indian Tribes

Source: 53 FR 43109, Oct. 25, 1988, unless otherwise noted.

§ 147.3100 EPA-administered program.

(a) *Contents.* The UIC program for the Indian lands in Oklahoma, except for that covering the Class II wells of the Five Civilized Tribes, is administered by EPA. The UIC program for all wells on Indian lands in Oklahoma, except Class II wells on the Osage Mineral Reserve (found at 40 CFR Part 147, Subpart GGG) and the Class II program for the Five Civilized Tribes consists of the requirements of 40 CFR Parts 124, 144, and 146 and additional requirements set forth in the remainder of this subpart. Injection well owners and operators and EPA shall comply with these requirements.

(b) *Effective date.* The effective date for the UIC program for all wells on Indian lands except Class II wells on the Osage Mineral Reserve and Class II wells on the lands of the Five Civilized Tribes is November 25, 1988.

§ 147.3101 Public notice of permit actions.

(a) In addition to the notice requirements of § 124.10 of this chapter, the Director shall provide to the affected Tribal government all notices given to an affected State government under § 124.10(c) of this chapter.

(b) *Class I and III wells.* In addition to the notice requirements of § 124.10 of this chapter:

(1) Owners and operators of Class I and III wells shall notify the affected Tribal government prior to submitting an application for a permit, shall publish such notice in at least two newspapers of general circulation in the area of the proposed well, and shall broadcast notice over at least one local radio station.

(2) The Director shall publish a notice of availability of a draft permit in at least two newspapers of general circulation in the area of the proposed well, and broadcast notice over at least one local radio station. The public notice shall allow at least 45 days for public comment.

(c) *Class II wells.* In addition to the notice requirements of § 124.10 of this chapter:

(1) Owners and operators of Class II wells shall give notice of application for a permit to the affected Tribal government prior to submitting the application to the Director.

(2) In addition to the public notice required for each action listed in § 124.10(a) of this chapter, the Director shall also publish notice in a daily or weekly newspaper of general circulation in the affected area for actions concerning Class II wells.

§ 147.3102 Plugging and abandonment plans.

In lieu of the requirements of § 144.28(c)(1) and (2)(i)-(iii) of this chapter, owners and operators of Class II wells shall comply with the plugging and abandonment provisions of § 147.3108 of this subpart.

§ 147.3103 Fluid seals.

Notwithstanding § 144.28(f)(2) and § 146.12(c) of this chapter, owners and operators shall not use a fluid seal as an alternative to a packer.

§ 147.3104 Notice of abandonment.

(a) In addition to the notice required by § 144.28(j)(2) of this chapter, the owner or operator shall at the same time submit plugging information in conformance with § 147.3108 of this subpart including:

(1) Type and number of plugs;

(2) Elevation of top and bottom of each plug;

(3) Method of plug placement; and

(4) Type, grade and quantity of cement to be used.

(b) In addition to the permit conditions specified in §§ 144.51 and 144.52 of this chapter, each owner and operator shall submit and each permit shall contain the following information (in conformance with 146.3108 of this subpart):

(1) Type and number of plugs;

(2) Elevation of top and bottom of each plug;

(3) Method of plug placement; and

(4) Type, grade and quantity of cement to be used.

§ 147.3105 Plugging and abandonment report.

(a) In lieu of the time periods for submitting a plugging report in § 144.28(k) of this chapter, owners and operators of Class I and III wells shall submit the report within 15 days of plugging the well and owners or operators of Class II wells within 30 days of plugging, or at the time of the next required operational report (whichever is less.) If the required operational report is due less than 15 days following completion of plugging, then the plugging report shall be submitted within 30 days for Class II wells and 15 days for Class I and III wells.

(b) In addition to the requirement of § 144.28(k)(1) of this chapter, owners and operators of Class II wells shall include a statement that the well was plugged in accordance with § 146.10 of this chapter and § 147.3109 of this subpart, and, if the actual plugging differed, specify the actual procedures used.

(c) The schedule upon which reports of plugging must be submitted are changed from those in § 144.51(o) to those specified in paragraph (a) of this section.

§ 147.3106 Area of review.

(a) When determining the area of review under § 146.6(b) of this chapter, the fixed radius shall be no less than one mile for Class I wells and one-half mile for Class II and III wells. In the case of an application for an area permit, determination of the area of review under § 146.6(b) shall be a fixed width of not less than one mile for the circumscribing area of Class I projects and one-half mile for the circumscribing area of Class II and III projects.

(b) However, in lieu of § 146.6(c) of this chapter, if the area of review is determined by a mathematical model pursuant to paragraph § 146.6(a) of this chapter, the permissible radius is the result of such calculation even if it is less than one mile for Class I wells and one-half for Class II and III wells.

§ 147.3107 Mechanical integrity.

(a) Monitoring of annulus pressure conducted pursuant to § 146.8(b)(1) shall be preceded by an initial pressure test. A positive gauge pressure on the casing/tubing annulus (filled with liquid) shall be maintained continuously. The pressure shall be monitored monthly.

(b) Pressure tests conducted pursuant to § 146.8(b)(2) of this chapter shall be performed with a pressure on the casing/tubing annulus of at least 200 p.s.i. unless otherwise specified by the Director. In addition, pressure tests conducted during well operation shall maintain an injection/annulus pressure differential of at least 100 p.s.i. throughout the tubing length.

(c) Monitoring of enhanced recovery wells conducted pursuant to § 146.8(b)(3), must be preceded by an initial pressure test that was conducted no more than 90 days prior to the commencement of monitoring.

§ 147.3108 Plugging Class I, II, and I wells.

In addition to the requirements § 146.10 of this chapter, owners a operators shall comply with the fo lowing when plugging a well:

(a) For Class I and III wells:

(1) The well shall be filled with m from the bottom of the well to a poi one hundred (100) feet below the t of the highest disposal or injecti zone and then with a cement p from there to at least one hund (100) feet above the top of the dispo or injection zone.

(2) A cement plug shall also be from a point at least fifty (50) f below the shoe of the surface casin a point at least five (5) feet above top of the lowest USDW.

(3) A final cement plug shall ext from a point at least thirty feet be the ground surface to a point five feet below the ground surface.

(4) All intervals between plugs s be filled with mud.

(5) The top plug shall clearly s by permanent markings inscribe the cement or on a steel plate em ded in the cement the well pe number and date of plugging.

(b) For Class II wells:

(1) The well shall be kept fu mud as casing is removed. No su casing shall be removed without ten approval from the Director.

(2) If surface casing is adequately set and cemented through all USDWs (set to at least 50 feet below the base of the USDW), a plug shall be set at least 50 feet below the shoe of the casing and extending at least 50 feet above the shoe of the casing; or

(3) If the surface casing and cementing is inadequate, the well bore shall be filled with cement from a point at least 50 feet below the base of the USDW to a point at least 50 feet above the shoe of the surface casing, and any additional plugs as required by the Director.

(4) In all cases, the top 20 feet of the well bore below 3 feet of ground surface shall be filled with cement. Surface casing shall be cut off 3 feet below ground surface and covered with a secure steel cap on top of the surface pipe. The remaining 3 feet shall be filled with dirt.

(5) Except as provided in sub-paragraph (b)(6) of this section, each producing or receiving formation shall be sealed off with at least a 50-foot cement plug placed at the base of the formation and at least a 50-foot cement plug placed at the top of the formation.

(6) The requirement in sub-paragraph (b)(5) of this section does not apply if the producing/receiving formation is already sealed off from the well bore with adequate casing and cementing behind casing, and casing is not to be removed, or the only openings from the producing/receiving formation into the well bore are perforations in the casing, and the annulus between the casing and the outer walls of the well is filled with cement for a distance of 50 feet above the top of the formation. When such conditions exist, a bridge plug capped with at least 10 feet of cement set at the top of the producing formation may be used.

(7) When specified by the Director, any uncased hole below the shoe of any casing to be left in the well shall be filled with cement to a depth of at least 50 feet below the casing shoe, or the bottom of the hole, and the casing above the shoe shall be filled with cement to at least 50 feet above the shoe of the casing. If the well has a screen or liner which is not to be removed, the well bore shall be filled with cement from the base of the screen or liner to at least 50 feet above the top of the screen or liner.

(8) All intervals between cement plugs in the well bore must be filled with mud.

(c) For the purposes of this section mud shall be defined as: mud of not less than thirty-six (36) viscosity (API Full Funnel Method) and a weight of not less than nine (9) pounds per gallon.

§ 147.3109 Timing of mechanical integrity test.

The demonstrations of mechanical integrity required bv § 146.14(b)(2) of this chapter prior to approval for the operation of a Class I well shall, for an existing well, be conducted no more than 90 days prior to application for the permit and the results included in the permit application. The owner or operator shall notify the Director at least seven days in advance of the time and date of the test so that EPA observers may be present.

PART 148—HAZARDOUS WASTE INJECTION RESTRICTIONS

Subpart A—General

Sec.

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148.3 Dilution prohibited as a substitute for treatment.
148.4 Procedures for case-by-case extensions to an effective date.
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Subpart B—Prohibitions on Injection

148.10 Waste specific prohibitions—solvent wastes.
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Sec.

Subpart C—Petition Standards and Procedures

148.20 Petitions to allow injection of a waste prohibited under Subpart B.
148.21 Information to be submitted in support of petitions.
148.22 Requirements for petition submission, review and approval or denial.
148.23 Review of exemptions granted pursuant to a petition.
148.24 Termination of approved petition.

AUTHORITY: Secs. 3004, Resource Conservation and Recovery Act, 42 U.S.C. 6901 *et seq.*

SOURCE: 53 FR 28154, July 26, 1988, unless otherwise noted.

Subpart A—General

§ 148.1 Purpose, scope and applicability.

(a) This part identifies hazardous wastes that are restricted from disposal into Class I hazardous waste injection wells and defines those circumstances under which a waste, otherwise prohibited from injection, may be injected.

(b) The requirements of this part apply to owners or operators of Class I hazardous waste injection wells used to inject hazardous waste.

(c) Wastes otherwise prohibited from injection may continue to be injected:

(1) If an extension from the effective date of a prohibition has been granted pursuant to § 148.4 with respect to such wastes; or

(2) If an exemption from a prohibition has been granted in response to a petition filed under § 148.20 to allow injection of restricted wastes with respect to those wastes and wells covered by the exemption; or

(3) If the waste is generated by a conditionally exempt small quantity generator, as defined in § 261.5; or

(4) Until November 8, 1988, if the waste has been determined to be contaminated soil or debris resulting from a response action taken under section 104 or 106 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 or a corrective action required under the Resource Conservation and Recovery Act.

(d) Wastes that are hazardous only because they exhibit a hazardous characteristic, and which are otherwise prohibited under this part, are not prohibited if the wastes:

(1) Are disposed into a nonhazardous or hazardous injection well defined under 40 CFR 144.6(a); and

(2) Do not exhibit any prohibited characteristic of hazardous waste identified in subpart C of part 261 at the point of injection.

[53 FR 28154, July 26, 1988, as amended at 55 FR 22683, June 1, 1990]

§ 148.2 Definitions.

Injection interval means that part of the injection zone in which the well is screened, or in which the waste is otherwise directly emplaced.

Transmissive fault or fracture is a fault or fracture that has sufficient permeability and vertical extent to allow fluids to move between formations.

§ 148.3 Dilution prohibited as a substitute for treatment.

The prohibition of § 268.3 shall apply to owners or operators of Class I hazardous waste injection wells.

§ 148.4 Procedures for case-by-case extensions to an effective date.

The owner or operator of a Class I hazardous waste injection well may submit an application to the Administrator for an extension of the effective date of any applicable prohibition established under Subpart B of this Part according to the procedures of § 268.5.

§ 148.5 Waste analysis.

Generators of hazardous wastes that are disposed of into Class I injection wells must comply with the applicable requirements of § 268.7 (a) and (b). Owners or operators of Class I hazardous waste injection wells must comply with the applicable requirements o § 268.7(c).

Subpart B—Prohibitions on Injection

§ 148.10 Waste specific prohibitions—so vent wastes.

(a) Effective August 8, 1988, th spent solvent wastes specified § 261.31 as EPA Hazardous Waste No

F001, F002, F003, F004, and F005 are prohibited from underground injection unless the solvent waste is a solvent-water mixture or solvent-containing sludge containing less than 1 percent total F001-F005 solvent constituents listed in Table A of this section.

(b) Effective August 8, 1990, all spent F001-F005 solvent wastes containing less than 1 percent total F001-F005 solvent constituents listed in Table A of this section are prohibited from injection.

(c) The requirements of paragraphs (a) and (b) of this section do not apply:

(1) If the wastes meet or are treated to meet the applicable standards specified in Subpart D of Part 268; or

(2) If an exemption from a prohibition has been granted in response to a petition under Subpart C of this Part; or

(3) During the period of extension of the applicable effective date, if an extension has been granted under § 148.4 of this part.

[53 FR 28154, July 26, 1988, as amended at 54 FR 25422, June 14, 1989]

§ 148.11 Waste specific prohibitions—dioxin-containing wastes.

(a) Effective August 8, 1988, the dioxin-containing wastes specified in §261.31 as EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, F027, and F028, and prohibited from underground injection.

(b) The requirements of paragraph (a) of this section do not apply:

(1) If the wastes meet or are treated to meet the applicable standards specified in Subpart D of Part 268; or

(2) If an exemption from a prohibition has been granted in response to a petition under Subpart C of this Part; or

(3) During the period of extension of the applicable effective date, if an extension has been granted under § 148.4 of this part.

[53 FR 28154, July 26, 1988, as amended at 54 FR 25422, June 14, 1989]

§ 148.12 Waste specific prohibitions—California list wastes.

(a) Effective August 8, 1988, the hazardous wastes listed in 40 CFR 268.32 containing polychlorinated biphenyls at concentrations greater than or equal to 50 ppm or halogenated organic compounds at concentrations greater than or equal to 10,000 mg/kg are prohibited from underground injection.

(b) Effective August 8, 1990, the following hazardous wastes are prohibited from underground injection:

(1) Liquid hazardous wastes, including free liquids associated with any solid or sludge, containing free cyanides at concentrations greater than or equal to 1,000 mg/l;

(2) Liquid hazardous wastes, including free liquids associated with any solid or sludge, containing the following metals (or elements) or compounds of these metals (or elements) at concentrations greater than or equal to those specified below:

(i) Arsenic and/or compounds (as As) 500 mg/l;

(ii) Cadmium and/or compounds (as Cd) 100 mg/l;

(iii) Chromium (VI) and/or compounds (as Cr VI) 500 mg/l;

(iv) Lead and/or compounds (as Pb) 500 mg/l;

(v) Mercury and/or compounds (as Hg) 20 mg/l;

(vi) Nickel and/or compounds (as Ni) 134 mg/l;

(vii) Selenium and/or compounds (as Se) 100 mg/l; and

(viii) Thallium and/or compounds (as Tl) 130 mg/l;

(3) Liquid hazardous waste having a pH less than or equal to two (2.0); and

(4) Hazardous wastes containing halogenated organic compounds in total concentration less than 10,000 mg/kg but greater than or equal to 1,000 mg/kg.

(c) The requirements of paragraphs (a) and (b) of this section do not apply:

(1) If the wastes meet or are treated to meet the applicable standards specified in Subpart D of Part 268; or

(2) If an exemption from a prohibition has been granted in response to a petition under Subpart C of this part; or

(3) During the period of extension of the applicable effective date, if an extension is granted under § 148.4 of this part.

[53 FR 30918, Aug. 16, 1988, as amended at 53 FR 41602, Oct. 24, 1988]

§ 148.14 Waste specific prohibitions—first third wastes.

(a) Effective June 7, 1989, the wastes specified in 40 CFR 261.31 as EPA Hazardous Waste numbers F006 (nonwastewaters) and the wastes specified in 40 CFR 261.32 as EPA Hazardous Waste numbers K001, K015 (wastewaters), K016 (at concentrations greater than or equal to 1%), K018, K019, K020, K021 (nonwastewaters generated by the process described in the waste listing description and disposed after August 17, 1988, and not generated in the course of treating wastewater forms of these wastes), K022 (nonwastewaters), K024, K030, K036 (nonwastewaters generated by the process described in the waste listing description and disposed after August 17, 1988, and not generated in the course of treating wastewater forms of these wastes), K037, K044, K045, nonexplosive K046 (nonwastewaters), K047, K048, K060 (nonwastewaters generated by the process described in the waste listing description and disposed after August 17, 1988, and not generated in the course of treating wastewater forms of these wastes), K061 (nonwastewaters), noncalcium sulfate K069 (nonwastewaters generated by the process described in the waste listing description and disposed after August 17, 1988, and not generated in the course of treating wastewater forms of these wastes), K086 solvent washes, K087, K099, K101 (all wastewaters and less than 1% total arsenic nonwastewaters), K102 (all wastewaters and less than 1% total arsenic nonwastewaters), and K103 are prohibited from underground injection.

(b) Effective June 8, 1989, the waste specified in 40 CFR 261.32 as EPA Hazardous Waste number K036 (wastewaters); and the wastes specified in 40 CFR 261.33 as P030, P039, P041, P063, P071, P089, P094, P097, U221, and U223 are prohibited from underground injection.

(c) Effective July 8, 1989, the wastes specified in 40 CFR 261.31 as EPA Hazardous Waste numbers F008 and F009 are prohibited from underground injection.

(d) Effective August 8, 1990, the wastes specified in 40 CFR 261.31 as EPA Hazardous Waste Number F006 (wastewaters) and F019; the wastes specified in 40 CFR 261.32 as EPA Hazardous Waste Numbers K004, K008, K015 (nonwastewaters), K017, K021 (wastewaters), K022 (wastewaters), K031, K035, K046 (reactive nonwastewaters and all wastewaters), K060 (wastewaters), K061 (wastewaters), K069 (calcium sulfate nonwastewaters and all wastewaters), K073, K083, K084, K085, K086 (all but solvent washes), K101 (high arsenic nonwastewaters), K102 (high arsenic nonwastewaters), and K106; and the wastes specified in 40 CFR part 261.33 as EPA Hazardou Waste Numbers P001, P004, P005, P010, P011, P012, P015, P016, P018, P020, P036, P037, P048, P050, P058, P059, P068, P069, P070, P081, P08 P084, P087, P092, P102, P105, P10 P110, P115, P120, P122, P123, U00 U009, U010, U012, U016, U018, U01 U022, U029, U031, U036, U037, U04 U043, U044, U046, U050, U051, U05 U061, U063, U064, U066, U067, U07 U077, U078, U086, U089, U103, U10 U108, U115, U122, U124, U129, U13 U133, U134, U137, U151, U154, U15 U157, U158, U159, U171, U177, U1 U185, U188, U192, U200, U209, U2 U211, U219, U220, U226, U227, U2 U237, U238, U248, and U249 are p hibited from underground injection off-site injection facilities.

(e) Effective August 8, 1990, wastes specified in 40 CFR 261.32 EPA Hazardous Waste numbers K0 K050, K051, K052, K062, K071, K104 are prohibited from und ground injection.

(f) Effective November 8, 1990, wastes specified in paragraph (d) this section are prohibited from und ground injection at on-site inject facilities.

(g) Effective June 7, 1991, the wa specified in 40 CFR 261.32 as Hazardous Waste numbers K016 concentrations less than 1%) are hibited from underground injection

(h) Effective June 8, 1991, the w specified in 40 CFR 261.31 as Hazardous Waste number F007;

the wastes specified in 40 CFR 261.32 as K011 (nonwastewaters) and K013 (nonwastewaters) are prohibited from underground injection.

(i) Effective May 8, 1992, the wastes specified in 40 CFR 261.32 and 261.33 as EPA Hazardous Waste Numbers K011 (wastewaters), K013 (wastewaters), and K014 are prohibited from underground injection.

(j) The requirements of paragraphs (a) through (i) of this section do not apply:

(1) If the wastes meet or are treated to meet the applicable standards specified in Subpart D of Part 268; or

(2) If an exemption from a prohibition has been granted in response to a petition under Subpart C of this Part; or

(3) During the period of extension of the applicable effective date, if an extension has been granted under § 148.4 of this Part.

[54 FR 25423, June 14, 1989, as amended at 54 FR 26647, June 23, 1989; 54 FR 35328, Aug. 25, 1989; 55 FR 22683, June 1, 1990]

§ 148.15 Waste specific prohibitions—Second third wastes.

(a) Effective June 7, 1989, the wastes specified in 40 CFR 261.32 as EPA Hazardous Waste numbers K025 (nonwastewaters generated by the process described in the waste listing description and disposed after August 17, 1988, and not generated in the course of treating wastewater forms of these wastes) are prohibited from underground injection.

(b) Effective June 8, 1989, the wastes specified in 40 CFR 261.31 as EPA Hazardous Waste numbers F010, F024; the wastes specified in 40 CFR 261.32 as K009 (nonwastewaters), K010, K027, K028, K029 (nonwastewaters), K038, K039, K040, K043, K095 (nonwastewaters), K096 (nonwastewaters), K113, K114, K115, K116; and wastes specified in 40 CFR 261.33 as P029, P040, P043, P044, P062, P074, P085, P098, P104, P106, P111, U028, U058, U107, and U235 are prohibited from underground injection.

(c) Effective July 8, 1989, and continuing until December 8, 1989, the wastes specified in 40 CFR 261.31 as EPA Hazardous Waste numbers F011 and F012 are prohibited from underground injection pursuant to the treatment standards specified in §§ 268.41 and 268.43 applicable to F007, F008, and F009 wastewaters and nonwastewaters. Effective December 8, 1989, F011 (nonwastewaters) and F012 (nonwastewaters) are prohibited pursuant to the treatment standards specified in §§ 268.41 and 268.43 applicable to F011 and F012 wastewaters and nonwastewaters.

(d) Effective August 8, 1990, the wastes specified in 40 CFR 261.32 as EPA Hazardous Waste Number K025 (wastewaters), K029 (wastewaters), K041, K042, K095 (wastewaters), K096 (wastewaters), K097, K098, and K105; and the wastes specified in 40 CFR part 261.33 as P002, P003, P007, P008, P014, P026, P027, P049, P054, P057, P060, P066, P067, P072, P107, P112, P113, P114, U002, U003, U005, U008, U011, U014, U015, U020, U021, U023, U025, U026, U032, U035, U047, U049, U057, U059, U060, U062, U070, U073, U080, U083, U092, U093, U094, U095, U097, U098, U099, U101, U106, U109, U110, U111, U114, U116, U119, U127, U128, U131, U135, U138, U140, U142, U143, U144, U146, U147, U149, U150, U161, U162, U163, U164, U165, U168, U169, U170, U172, U173, U174, U176, U178, U179, U189, U193, U196, U203, U205, U206, U208, U213, U214, U215, U216, U217, U218, U239, and U244 are prohibited from underground injection at off-site injection facilities.

(e) Effective June 8, 1991, the waste specified in 40 CFR 261.32 as EPA Hazardous Waste number K009 (wastewaters) is prohibited from underground injection.

(f) Effective November 8, 1990, the wastes specified in paragraph (d) of this section are prohibited from underground injection at on-site injection facilities.

(g) The requirements of paragraphs (a) through (f) of this section do not apply:

(1) If the wastes meet or are treated to meet the applicable standards specified in Subpart D of Part 268; or

(2) If an exemption from a prohibition has been granted in response to a petition under Subpart C of this Part; or

(3) During the period of extension of the applicable effective date, if an ex-

tension has been granted under § 148.4 of this Part.

[54 FR 25423, June 14, 1989, as amended at 54 FR 26647, June 23, 1989; 55 FR 22683, June 1, 1990]

§ 148.16 Waste specific prohibitions—third third wastes.

(a) Effective June 7, 1989, the wastes specified in 40 CFR 261.32 as EPA Hazardous Waste numbers K100 (nonwastewaters generated by the process described in the waste listing description and disposed after August 17, 1988, and not generated in the course of treating wastewater forms of these wastes) are prohibited from underground injection.

(b) Effective June 8, 1989, the wastes specified in 40 CFR 261.32 as EPA Hazardous Waste numbers K005 (nonwastewaters), K007 (nonwastewaters), K023, K093, K094; and the wastes specified in 40 CFR 261.33 as P013, P021, P099, P109, P121, U069, U087, U088, U102, and U190 are prohibited from underground injection.

(c) Effective August 8, 1990, the wastes identified in 40 CFR 261.31 as EPA Hazardous Waste Number F039 (multi-source leachate); the wastes specified in 40 CFR 261.32 EPA Hazardous Waste Numbers K002, K003, K005 (wastewaters), K006, K007 (wastewaters), K023, K026, K032, K033, K034, K093, K094 and K100 (wastewaters); the wates specified in 40 CFR 261.33 as P006, P009, P017, P022, P023, P024, P028, P031, P033, P034, P038, P042, P045, P046, P047, P051, P056, P064, P065, P073, P075, P076, P077, P078, P088, P093, P095, P096, P099, P101, P103, P109, P116, P118, P119, U001, U004, U006, U017, U024, U027, U030, U033, U038, U034, U038, U039, U042, U045, U048, U052, U055, U056, U068, U071, U072, U075, U076, U079, U081, U082, U084, U085, U087, U088, U090, U091, U096, U112, U113, U117, U118, U120, U121, U123, U125, U126, U132, U136, U139, U141, U145, U148, U152, U153, U156, U160, U166, U167, U181, U182, U183, U184, U186, U187, U191, U194, U197, U201, U202, U204, U207, U222, U225, U234, U236, U240, U243, and U247; and the wastes identified in 40 CFR 261.21, 261.23 or 261.24 as hazardous based on a characteristic alone, designated as D001, D004, D005, D006, D008, D009 (wastewaters), D010, D011, D012, D013, D014, D015, D016, D017 are prohibited from underground injection at off-site injection facilities.

(d) Effective August 8, 1990, mixed radioactive/hazardous waste in 40 CFR 268.10, 268.11, and 268.12, that are mixed radioactive and hazardous wastes, are prohibited from underground injection.

(e) Effective November 8, 1990, the wastes specified in paragraph (c) of this section are prohibited from underground injection at on-site injection facilities. These effective dates do not apply to the wastes listed in 40 CFR 148.12(b) which are prohibited from underground injection on August 8, 1990.

(f) Effective May 8, 1992, the wastes identified in 40 CFR 261.22, 261.23 or 261.24 as hazardous based on a characteristic alone, designated as D002 (wastewaters and nonwastewaters), D003 (wastewaters and nonwastewaters), D007 (wastewaters and nonwastewaters), and D009 (nonwastewaters) are prohibited from underground injection. These effective dates do no apply to the wastes listed in 40 CFR 148.12(b) which are prohibited from underground injection on August 8, 1990.

(g) The requirements of paragraphs (a) through (f) of this section do not apply:

(1) If the wastes meet or are treated to meet the applicable standards specified in Subpart D of Part 268; or

(2) If an exemption from a prohibition has been granted in response to a petition under Subpart C of this Part; or

(3) During the period of extension of the applicable effective date, if an extension has been granted under § 148.4 of this Part.

[54 FR 25423, June 14, 1989, as amended at 54 FR 26647, June 23, 1989; 55 FR 22683, June 1, 1990]

Subpart C—Petition Standards and Procedures

§148.20 Petitions to allow injection of a waste prohibited under Subpart B.

(a) Any person seeking an exemption from a prohibition under Subpart B of this part for the injection of a restricted hazardous waste into an injection well or wells shall submit a petition to the Director demonstrating that, to a reasonable degree of certainty, there will be no migration of hazardous constituents from the injection zone for as long as the waste remains hazardous. This demonstration requires a showing that:

(1) The hydrogeological and geochemical conditions at the sites and the physiochemical nature of the waste stream(s) are such that reliable predictions can be made that:

(i) Fluid movement conditions are such that the injected fluids will not migrate within 10,000 years:

(A) Vertically upward out of the inection zone; or

(B) Laterally within the injection one to a point of discharge or interface with an Underground Source of Drinking Water (USDW) as defined in 40 CFR Part 146; or

(ii) Before the injected fluids migrate out of the injection zone or to a point of discharge or interface with USDW, the fluid will no longer be hazardous because of attenuation, transformation, or immobilization of hazardous constituents within the injection zone by hydrolysis, chemical nteractions or other means; and

(2) For each well the petition has:

(i) Demonstrated that the injection well's area of review complies with the ubstantive requirements of § 146.63;

(ii) Located, identified, and asceraained the condition of all wells within he injection well's area of review (as pecified in § 146.63) that penetrate he injection zone or the confining one by use of a protocol acceptable to he Director that meets the substanive requirements of § 146.64;

(iii) Submitted a corrective action plan that meets the substantive requirements of § 146.64, the implemenation of which shall become a condiion of petition approval; and

(iv) Submitted the results of pressure and radioactive tracer tests performed within one year prior to submission of the petition demonstrating the mechanical integrity of the well's long string casing, injection tube, annular seal, and bottom hole cement. In cases where the petition has not been approved or denied within one year after the initial demonstration of mechanical integrity, the Director may require the owner or operator to perform the tests again and submit the results of the new tests.

NOTE: The requirements of § 148.20(a)(2) need not be incorporated in a permit at the time of petition approval.

(b) A demonstration under § 148.20(a)(1)(i) shall identify the strata within the injection zone which will confine fluid movement above the injection interval and include a showing that this strata is free of known transmissive faults of fractures and that there is a confining zone above the injection zone.

(c) A demonstration under § 148.20(a)(1)(ii) shall identify the strata within the injection zone where waste transformation will be accomplished and include a showing that this strata is free of known transmissive faults or fractures and that there is a confining zone above the injection zone.

(d) A demonstration may include a showing that:

(1) Treatment methods, the implementation of which shall become a condition of petition approval, will be utilized that reduce the toxicity or mobility of the wastes; or

(2) A monitoring plan, the implementation of which shall become a condition of petition approval, will be utilized to enhance confidence in one or more aspects of the demonstration.

(e) Any person who has been granted an exemption pursuant to this section may submit a petition for reissuance of the exemption to include an additional restricted waste or wastes or to modify any conditions placed on the exemption by the Director. The Director shall reissue the petition if the petitioner complies with the requirements of paragraphs (a), (b) and (c) of this section.

(f) Any person who has been granted an exemption pursuant to this section may submit a petition to modify an exemption to include an additional (hazardous) waste or wastes. The Director may grant the modification if he determines, to a reasonable degree of certainty, that the additional waste or wastes will behave hydraulically and chemically in a manner similar to previously included wastes and that it will not interfere with the containment capability of the injection zone.

§ 148.21 Information to be submitted in support of petitions.

(a) Information submitted in support of § 148.20 must meet the following criteria:

(1) All waste analysis and any new testing performed by the petitioner shall be accurate and reproducible and performed in accordance with quality assurance standards;

(2) Estimation techniques shall be appropriate, and EPA-certified test protocols shall be used where available and appropriate;

(3) Predictive models shall have been verified and validated, shall be appropriate for the specific site, waste streams, and injection conditions of the operation, and shall be calibrated for existing sites where sufficient data are available;

(4) An approved quality assurance and quality control plan shall address all aspects of the demonstration;

(5) Reasonably conservative values shall be used whenever values taken from the literature or estimated on the basis of known information are used instead of site-specific measurements; and

(6) An analysis shall be performed to identify and assess aspects of the demonstration that contribute significantly to uncertainty. The petitioner shall conduct a sensitivity analysis to determine the effect that significant uncertainty may contribute to the demonstration. The demonstration shall then be based on conservative assumptions identified in the analysis.

(b) Any petitioner under § 148.20(a)(1)(i) shall provide sufficient site-specific information to support the demonstration, such as:

(1) Thickness, porosity, permeability and extent of the various strata in the injection zone;

(2) Thickness, porosity, permeability, extent, and continuity of the confining zone;

(3) Hydraulic gradient in the injection zone;

(4) Hydrostatic pressure in the injection zone; and

(5) Geochemical conditions of the site.

(c) In addition to the information in § 148.21(b), any petitioner under § 148.20(a)(1)(ii) shall provide sufficient waste-specific information to ensure reasonably reliant predictions about the waste transformation. The petitioner shall provide the information necessary to support the demonstration, such as:

(1) Description of the chemical processes or other means that will lead to waste transformation; and

(2) Results of laboratory experiments verifying the waste transformation.

§ 148.22 Requirements for petition submission, review and approval or denial.

(a) Any petition submitted to the Director pursuant to § 148.20(a) shall include the following components:

(1) An identification of the specific waste or wastes and the specific injection well or wells for which the demonstration will be made;

(2) A waste analysis to describe fully the chemical and physical characteristics of the subject wastes;

(3) Such additional information as is required by the Director to support the petition under §§148.20 and 148.21; and

(4) This statement signed by the petitioner or an authorized representative:

> I certify under penalty of law that I have personally examined and am familiar with the information submitted in this petition and all attached documents, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

(b) The Director shall provide public notice and an opportunity for public comment in accordance with the procedures in §124.10 of the intent to approve or deny a petition. The final decision on a petition will be published in the FEDERAL REGISTER.

(c) If an exemption is granted it will apply only to the underground injection of the specifice restricted waste or wastes identified in the petition into a Class I hazardous waste injection well or wells specifically identified in the petition (unless the exemption is modified or reissued pursuant to § 148.20(e) or (f).

(d) Upon request by any petitioner who obtains an exemption for a well under this Subpart, the Director shall initiate and reasonably expedite the necessary procedures to issue or reissue a permit or permits for the hazardous waste well or wells covered by the exemption for a term not to exceed ten years.

§ 148.23 Review of exemptions granted pursuant to a petition.

(a) When considering whether to reissue a permit for the operation of a Class I hazardous waste injection well, the Director shall review any petition filed pursuant to § 148.20 and require a new demonstration if information shows that the basis for granting the exemption may no longer be valid.

(b) Whenever the Director determines that the basis for approval of a petition may no longer be valid, the Director shall require a new demonstration in accordance with § 148.20.

§ 148.24 Termination of approved petition.

(a) The Director may terminate an exemption granted under § 148.20 for the following causes:

(1) Noncompliance by the petitioner with any condition of the exemption;

(2) The petitioner's failure in the petition or during the review and approval to disclose fully all relevant facts, or the petitioner's misrepresentation of any relevant facts at any time; or

(3) A determination that new information shows that the basis for approval of the petition is no longer valid.

(b) The Director shall terminate an exemption granted under § 148.20 for the following causes:

(1) The petitioner's willful withholding during the review and approval of the petition of facts directly and materially relevant to the Director's decision on the petition;

(2) A determination that there has been migration from the injection zone or the well that is not in accordance with the terms of the exemption, except that the Director may at his discretion decide not to terminate where:

(i) The migration resulted from a mechanical failure of the well that can be corrected promptly through a repair to the injection well itself or from an undetected well or conduit that can be plugged promptly; and

(ii) The requirements of § 146.67(i) are satisfied.

(c) The Director shall follow the procedures in § 124.5 in terminating any exemption under this section.

PART 149—SOLE SOURCE AQUIFERS

Subpart A—Criteria for Identifying Critical Aquifer Protection Areas

Sec.
149.1 Purpose.
149.2 Definitions.
149.3 Critical Aquifer Protection Areas.

Subpart B—Review of Projects Affecting the Edwards Underground Reservoir, A Designated Sole Source Aquifer in the San Antonio, Texas Area

149.100 Applicability.
149.101 Definitions.
149.102 Project review authority.
149.103 Public information.
149.104 Submission of petitions.
149.105 Decision to review.
149.106 Notice of review.
149.107 Request for information.
149.108 Public hearing.
149.109 Decision under section 1424(e).
149.110 Resubmittal of redesigned projects.
149.111 Funding to redesigned projects.

AUTHORITY: Sec. 1424(e), Safe Drinking Water Act (42 U.S.C. 300h-3(e); sec. 1427 of the Safe Drinking Water Act, (42 U.S.C. 300h-6).

Subpart A—Criteria for Identifying Critical Aquifer Protection Areas

SOURCE: 52 FR 23986, June 26, 1987, unless otherwise noted.

§ 149.1 Purpose.

The purpose of this subpart is to provide criteria for identifying critical aquifer protection areas, pursuant to section 1427 of the Safe Drinking Water Act (SDWA).

§ 149.2 Definitions.

(a) *Aquifer* means a geological formation, group of formations, or part of a formation that is capable of yielding a significant amount of water to a well or spring.

(b) *Recharge* means a process, natural or artificial, by which water is added to the saturated zone of an aquifer.

(c) *Recharge Area* means an area in which water reaches the zone of saturation (ground water) by surface infiltration; in addition, a "*major recharge area*" is an area where a major part of the recharge to an aquifer occurs.

(d) *Sole or Principal Source Aquifer* (SSA) means an aquifer which is designated as an SSA under section 1424(e) of the SDWA.

[54 FR 6843, Feb. 14, 1989]

§ 149.3 Critical Aquifer Protection Areas.

A Critical Aquifer Protection Area is either:

(a) All or part of an area which was designated as a sole or principal source aquifer prior to June 19, 1986, and for which an areawide ground-water quality protection plan was approved, under section 208 of the Clean Water Act, prior to that date; or

(b) All or part of a major recharge area of a sole or principal source aquifer, designated before June 19, 1988, for which:

(1) The sole or principal source aquifer is particularly vulnerable to contamination due to the hydrogeologic characteristics of the unsaturated or saturated zone within the suggested critical aquifer protection area; and

(2) Contamination of the sole or principal source aquifer is reasonably likely to occur, unless a program to reduce or prevent such contamination is implemented; and

(3) In the absence of any program to reduce or prevent contamination, reasonably foreseeable contamination would result in significant cost, taking into account:

(i) The cost of replacing the drinking water supply from the sole or principal source aquifer, and

(ii) Other economic costs and environmental and social costs resulting from such contamination.

[54 FR 6843, Feb. 14, 1989]

Subpart B—Review of Projects Affecting the Edwards Underground Reservoir, A Designated Sole Source Aquifer in the San Antonio, Texas Area

SOURCE: 42 FR 51574, Sept. 29, 1977, unless otherwise noted. Redesignated at 52 FR 23986, June 26, 1987.

§ 149.100 Applicability.

This subpart sets forth, pursuant to sections 1424(e) and 1450 of the Public Health Service Act, as amended by the Safe Drinking Water Act, Pub. L. 93-523, regulations relating the Edwards Underground Reservoir which is the sole or principal drinking water source for the San Antonio area and which, if contaminated, would create a significant hazard to public health.

[42 FR 51574, Sept. 29, 1977. Redesignated and amended at 52 FR 23986, June 26, 1987]

§ 149.101 Definitions.

As used in this subpart and except as otherwise specifically provided, the term(s):

(a) "Act" means the Public Health Service Act, as amended by the Safe Drinking Water Act, Pub. L. 93-523.

(b) "Contaminant" means any physical, chemical, biological, or radiological substance or matter in water.

(c) "Recharge zone" means the area through which water enters the Edwards Underground Reservoir as defined in the December 16, 1975, Notice of Determination.

(d) "Administrator" (Regional Administrator) means the Administrator (Regional Administrator) of the

Jnited States Environmental Protec-
ion Agency.

(e) "Person" means an individual,
orporation, company, association,
artnership, State, or municipality.

(f) "Project" means a program or
ction for which an application for
'ederal financial assistance has been
nade.

(g) "Federal financial assistance"
neans any financial benefits provided
lirectly as aid to a project by a depart-
nent, agency, or instrumentality of
he Federal government in any form
ncluding contracts, grants, and loan
uarantees. Actions or programs car-
ied out by the Federal government
tself such as dredging performed by
he Army Corps of Engineers do not
nvolve Federal financial assistance.
ctions performed for the Federal
overnment by contractors, such as
onstruction of roads on Federal lands
y a contractor under the supervision
f the Bureau of Land Management,
hould be distinguished from contracts
ntered into specifically for the pur-
ose of providing financial assistance,
nd will not be considered programs or
ctions receiving Federal financial as-
istance. Federal financial assistance is
imited to benefits earmarked for a
pecific program or action and directly
warded to the program or action. In-
lirect assistance, e.g., in the form of a
oan to a developer by a lending insti-
ution which in turn receives Federal
ssistance not specifically related to
he project in question is not Federal
inancial assistance under section
424(e).

(h) "Commitment of Federal finan-
ial assistance" means a written agree-
nent entered into by a department,
gency, or instrumentality of the Fed-
ral Government to provide financial
ssistance as defined in paragraph (g)
f this section. Renewal of a commit-
nent which the issuing agency deter-
nines has lapsed shall not constitute a
ew commitment unless the Regional
dministrator determines that the
roject's impact on the aquifer has not
een previously reviewed under sec-
ion 1424(e). The determination of a
'ederal agency that a certain written
greement constitutes a commitment
hall be conclusive with respect to the
xistence of such a commitment.

(i) "Streamflow source zone" means the upstream headwaters area which drains into the recharge zone as defined in the December 16, 1975, Notice of Determination.

(j) "Significant hazard to public health" means any level of contaminant which causes or may cause the aquifer to exceed any maximum contaminant level set forth in any promulgated National Primary Drinking Water Standard at any point where the water may be used for drinking purposes or which may otherwise adversely affect the health of persons, or which may require a public water system to install additional treatment to prevent such adverse effect.

(k) "Aquifer" means the Edwards Underground Reservoir.

[42 FR 51574, Sept. 29, 1977. Redesignated and amended at 52 FR 23986, June 26, 1987]

§ 149.102 Project review authority.

(a) Once an area is designated, no subsequent commitments of Federal financial assistance may be made to projects which the Administrator determines may contaminate the aquifer so as to create a significant hazard to public health.

(b) The Regional Administrator is hereby delegated the authority and assigned responsibility for carrying out the project review process assigned to the Administrator under section 1424(e) of the Act, except the final determination that a project may contaminate the aquifer through its recharge zone so as to create a significant hazard to public health.

(c) The Regional Administrator may review any project which he considers may potentially contaminate the aquifer through its recharge zone so as to create a significant hazard to public health.

§ 149.103 Public information.

After the area is designated under section 1424(e), Federal agencies, for projects, located in the recharge zone and streamflow source zones, are required to:

(a) Maintain a list of projects for which environmental impact statements will be prepared in accordance with the National Environmental Policy Act (NEPA);

(b) Revise the list at regular intervals and submit to EPA; and

(c) Make the list available to the public upon request.

§ 149.104 Submission of petitions.

Any person may submit a petition requesting the Regional Administrator to review a project to determine if such project may contaminate the aquifer through its recharge zone so as to create a significant hazard to public health. Any such petition shall identify:

(a) The name, address, and telephone number of the individual, organization, or other entity submitting the petition;

(b) A brief statement of the requesting person's interest in the Regional Administrator's determination;

(c) The name of the project and Federal agency involved;

In addition, the petitioner is requested to submit to EPA available information on:

(d) Applicable action already taken by State and local agencies including establishment of regulations to prevent contamination of the aquifer and why, in the petitioner's judgment, the action was inadequate.

(e) Any actions taken under the National Environmental Policy Act and why, in the petitioner's judgment, that action was inadequate in regard to evaluation of potential effect on the aquifer.

(f) The potential contaminants involved;

(g) The means by which the contaminant might enter the aquifer; and

(h) The potential impact of the proposed project.

§ 149.105 Decision to review.

(a) The Regional Administrator shall review under section 1424(e) all projects located in the recharge or streamflow source zone of the aquifer for which a draft or final EIS is submitted which may have an impact on ground water quality and which involve Federal financial assistance as defined in these regulations.

(b) Upon receipt of a public petition, the Regional Administrator shall decide whether the project which is the subject of the petition should be reviewed under section 1424(e).

(c) The Regional Administrator may decide to review a project upon his own motion.

(d) In determining whether to review a project upon receipt of a public petition or upon his own motion, the Regional Administrator shall consider whether the project is likely to directly or indirectly cause contamination of the aquifer through its recharge zone, taking into account any factors he deems relevant, including:

(1) The location of the project, and

(2) The nature of the project.

(e) In determining whether to review a project upon receipt of a public petition or upon his own motion, the Regional Administrator may consult with, or request information from, the Federal agency to which the project application has been made, the applicant seeking Federal assistance, appropriate State and local agencies, and other appropriate persons or entities.

(f) In determining whether to review a project which is the subject of a public petition, the Regional Administrator may request such additional information from the petitioner as he deems necessary.

§ 149.106 Notice of review.

(a) *Notice to Federal agency.* If the Regional Administrator decides upon receipt of a public petition or upon his own motion to review a project under section 1424(e), he shall give written notification of the decision to the Federal agency from which financial assistance is sought. The notification shall include a description and identification of the project.

(b) *Notice to public.* When the Regional Administrator undertakes to review a project pursuant to § 149.13 above, he shall provide public notice of project review by such means as he deems appropriate. The notice shall set forth the availability for public review of all data and information available, and shall solicit comments, data and information with respect to the determination of impact under section 1424(e). The period for public nment shall be 30 days after public tice unless the Regional Administra- extends the period at his discretion a public hearing is held under 49.16.

49.107 Request for information.

n reviewing a project under section 24(e), the Regional Administrator ay request any additional informa- n from the funding Federal agency aich is pertinent to reaching a deci- n. If full evaluation of the ground- ter impact of a project has not been bmitted in accordance with the ency's NEPA procedures, the Re- nal Administrator may specifically quest that the Federal agency bmit a groundwater impact evalua- n of whether the proposed project ay contaminate the aquifer through recharge zone so as to create a sig- ficant hazard to public health.

49.108 Public hearing.

If there is significant public interest, e Regional Administrator may hold public hearing with respect to any oject or projects to be reviewed if he ads that such a hearing is necessary d would be helpful in clarifying the ues. Public hearings held under this ction should be coordinated, if possi- e, with other Federal public hearings ld pursuant to applicable laws and gulations. Any such hearing shall be nducted by the Regional Adminis- ator or designee in an informal, or- rly and expeditious manner. Where propriate, limits may be placed on the time allowed for oral state- ents, and statements may be re- ired to be submitted in writing. The cord will be held open for further blic comment for seven (7) days fol- wing the close of the public hearing.

149.109 Decision under section 1424(e).

(a) As soon as practicable after the bmission of public comments under ction 1424(e) and information re- uested by the Environmental Protec- on Agency from the originating Fed- al agency, on the basis of such infor- ation as is available to him, the Re- ional Administrator shall review the roject taking all relevant factors into ccount including:

(1) The extent of possible public health hazard presented by the project;

(2) Planning, design, construction, operation, maintenance and monitoring measures included in the project which would prevent or mitigate the possible health hazard;

(3) The extent and effectiveness of State or local control over possible contaminant releases to the aquifer;

(4) The cumulative and secondary impacts of the proposed project; and

(5) The expected environmental benefits of the proposed project.

(b) After reviewing the available information, the Regional Administrator shall:

(1) Determine that the risk of contamination of the aquifer through the recharge zone so as to create a significant hazard to public health is not sufficiently great so as to prevent commitment of Federal funding to the project; or

(2) Forward the information to the Administrator with his recommendation that the project may contaminate the aquifer through the recharge zone so as to create a significant hazard to public health.

(c) After receiving the available information forwarded by the Regional Administrator, the Administrator shall:

(1) Determine that the risk of contamination of the aquifer through the recharge zone so as to create a significant hazard to public health is not sufficiently great so as to prevent commitment of Federal funding to the project; or

(2) Determine that the project may contaminate the aquifer through the recharge zone so as to create a significant hazard to public health.

(d) Notice of any decisions by the Regional Administrator under paragraph (b)(1) of this section or by the Administrator under paragraphs (c)(1) and (2) of this section to prevent a commitment of Federal funding shall be published in the FEDERAL REGISTER. Such notices shall include a description of the propsed project, and a statement of decision with an accompanying statement of facts and reasons.

§ 149.110 Resubmittal of redesigned projects.

If a project is redesigned in response to EPA's objections, the applicant for Federal financial assistance or the grantor agency may file a petition with the Regional Administrator for withdrawal of the determination that the project may contaminate the aquifer through the recharge zone so as to create a significant hazard to public health. Any such petition shall demonstrate how the project has been redesigned so as to justify the withdrawal of EPA's objections. If appropriate, the Regional Administrator may request public comments or hold an informal public hearing to consider the petition. After review of pertinent information, the Regional Administrator shall either deny the petition or recommend to the Administrator that the initial determination that a project may contaminate the aquifer be vacated. Upon receipt of a recommendation from the Regional Administrator that a determination be vacated, the Administrator shall either deny the petition or order that the initial determination be vacated. The final decision regarding a petition shall be published in the FEDERAL REGISTER with an accompanying statement of reasons.

§ 149.111 Funding to redesigned projects.

After publication of a decision that a proposed project may contaminate a sole or principal source aquifer in a designated area through its recharge zone so as to create a significant hazard to public health, a commitment for Federal financial assistance may be entered into, if authorized under another provision of law, to plan or redesign such project to assure that it will not so contaminate the aquifer.

FINDING AIDS

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list of CFR titles, subtitles, chapters, subchapters and parts and an alpha-
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Material Approved for Incorporation by Reference

(Revised as of June 29, 1990)

The Director of the Federal Register has approved under 5 U.S.C. 552(a) and 1 CFR Part 51 the incorporation by reference of the following publications. This list contains only those incorporations by reference effective as of the revision date of this volume. Incorporations by reference found within a regulation are effective upon the effective date of that regulation. For more information on incorporation by reference, see the preliminary pages of this volume.

40 CFR CHAPTER I (PARTS 122 AND 141): SUBCHAPTER D—WATER PROGRAMS ENVIRONMENTAL PROTECTION AGENCY

	40 CFR
American Society for Testing and Materials	
1916 Race St., Philadelphia, PA 19103	
ASTM D 2459–75 Gamma Spectrometry in Water	141.25(a)(6)
ASTM D 2907–75 Micro-quantities of Uranium in Water by Flourometry.	141.25(a)(7)
American Water Works Association Research Foundation	
6666 West Quincy Avenue, Denver, CO 80235 (telephone 303–794–7711)	
National Field Evaluation of a Defined Substrate Method for the Simultaneous Enumeration of Total Coliforms and *Escherichia coli* from Drinking Water: Comparison with the Standard Multiple Tube Fermentation Method, Stephen C. Edberg, Martin J. Allen, Darwell B. Smith, and the National Collaborative Study, which appears in *Applied and Environmental Microbiology*, Volume 54, pages 1595–1601, June 1988, as amended under Erratum, *Applied and Environmental Microbiology*, Volume 54, page 3197.	141.21(a)
Department of Commerce	
National Bureau of Standards, Washington, D.C. 20234	
Handbook No. 69, Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air or Water for Occupational Exposure, August 1963.	141.16(b)
Department of Energy	
Environmental Measurements Laboratory, 376 Hudson St., New York, NY 10014	
HASL Procedures Manual HASL—300, 1976	141.25(b)(2)
Environmental Protection Agency	
Environmental Monitoring & Support Laboratory (EMSL), 25 W. St. Clair St., Cincinnati, OH 45268	
Interim Radiochemical Methodology for Drinking Water, EMSL, EPA–600/4–75–008.	141.25(a)
Office of Solid Waste and Emergency Response, Waste Characterization Branch, Washington, DC 20460	
The above standards are also available at the Office of Drinking Water, Criteria and Standards Division, Environmental Protection Agency, 401 M St., S.W., Washington, DC 20460	

40 CFR CHAPTER I (PART 136): GUIDELINES ESTABLISHING TEST PROCEDURES FOR THE ANALYSIS OF POLLUTANTS ENVIRONMENTAL PROTECTION AGENCY

American National Standards Institute

Available from American Standards Institute, 1430 Broadway, New York, New York 10018

ANSI PH4.37–1975, American National Standard on Photographic Processing Effluents, April 2, 1975:

Biochemical oxygen demand (BOD_5), p. 17	136.3(a) Table IB; 136.3(b)
Cadmium, total, AA furnace, p. 37	136.3(a) Table IB; 136.3(b)
Chemical oxygen demand (COD), p. 17	136.3(a) Table IB; 136.3(b)
Cobalt, total, AA direct aspiration, p. 37	136.3(a) Table IB; 136.3(b)
Copper, total, AA direct aspiration, p. 37	136.3(a) Table IB; 136.3(b)
Cyanide, total, p. 22	136.3(a) Table IB; 136.3(b)
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Silver, total, AA furnace, p. 37	136.3(a) Table IB; 136.3(b)
Zinc, total, AA furnace, p. 37	136.3(a) Table IB; 136.3(b)

American Public Health Association, American Water Works Association, Water Pollution Control Federation

Available from American Public Health Association, 1015 Fifteenth Street, N.W., Washington, D.C. 20036

Selected Analytical Methods Approved and Cited by the United States Environmental Protection Agency, Supplement to the 15th Edition of Standards Methods for the Examination of Water and Wastewater, 1981:

Ametryne, GC, p. S68	136.3(a) Table ID; 136.3(b)
Aminocarb, TLC, p. S60	136.3(a) Table ID; 136.3(b)
Atraton, GC, p. S68	136.3(a) Table ID; 136.3(b)
Atrazine, GC, p. S68	136.3(a) Table ID; 136.3(b)
Azinphos methyl, GC, p. S51	136.3(a) Table ID; 136.3(b)
Barban, TLC, p. S64	136.3(a) Table ID; 136.3(b)
Benzyl chloride, p. S102	136.3(a) Table IC; 136.3(b)
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Carbaryl, TLC, p. S60	136.3(a) Table ID; 136.3(b)
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Monuron, TLC, p. S64	136.3(a) Table ID; 136.3(b)
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Alabama; (1) Alabama Water Pollution Control Act, Code of Alabama 1975, §§ 22–22–1 through 22–22–14 (1980 and Supp. 1983); (2) Regulations, Policies and Procedures of the Alabama Water Improvement Commission, Title I (Regulations) (Rev. December 1980), as amended May 17, 1982, to add Chapter 9, Underground Injection Control Regulations (effective June 10, 1982), as amended April 6, 1983 (effective May 11, 1983)..	147.51
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Illinois: (1) Illinois Environmental Protection Act, Illinois ch. 111½, §§ 1001–1051 (Smith-Hurd 1977 Revised Statutes and Supp. 1983), as amended by Public Act No. 83–431, 1983 Illinois Legislative Service, pages 2910–2916 (West); (2) Illinois Pollution Control Board Rules and Regulations at Title 35, Illinois Administrative Code, Chapter I, Part 700, Outline of Waste Disposal Regulations; Part 702, RCRA and UIC Permit Programs; Part 704, UIC Permit Program; Part 705, Procedures for Permit Issuance and Part 730, Underground Injection Control Operating Requirements as amended by IPCB Order No. R–83039 on December 15, 1983..	147.700
Illinois: (1) Conservation of Oil and Gas, etc., Illinois Revised Statutes ch. 96½, §§ 5401–5457 (Smith-Hurd 1979 and Supp. 1983), as amended by Public Act No. 83–1074 1983 Illinois Legislative Service pages 7183–7185 (West); (2) Illinois Environmental Protection Act, Illinois Revised Statutes ch. 111½, §§ 1001–1051 (Smith-Hurd 1977 and Supp. 1983), as amended by Public Act No. 83–431, 1983 Illinois Legislative Services pages 2910–2916 (West); (3) Illinois Revised Statutes ch. 100½, §§ 26 (Smith-Hurd Supp. 1983); (4) Illinois Department of Mines and Minerals Regulations for the Oil and Gas Division, Rules I, II, IIA, III, V, VII, and IX (1981)..	147.701
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Maine: (1) Maine Revised Statutes Annotated title 38, §§ 361–A, 363–B, 413, 414, 414–A, 420, and 1317–A (1978); (2) Rules to Control the Subsurface Discharge of Pollutants by Well Injection, Rules of the Department of Environmental Protection, Chapter 543 (adopted June 22, 1983, effective July 4, 1983)..	147.100
Massachusetts: (1) Massachusetts General Laws Annotated ch. 21, §§ 27, 43, and 44 (West 1981); (2) Code of Massachusetts Regulations, title 310, §§ 23.01–23.11 as amended April 26, 1982..	147.1100
Mississippi: (1) Mississippi Air and Water Pollution Control Law, Mississippi Code Annotated §§ 49–17–1 through 49–17–29 (1972) and Supp. 1983); (2) Mississippi Department of Natural Resources, Bureau of Pollution Control, Underground Injection Control Program Regulations (adopted February 11, 1982); (3) Mississippi Department of Natural Resources, Bureau of Pollution Control, State of Mississippi Wastewater Permit Regulations for National Pollutant Discharge Elimination System (NPDES), Underground Injection Control (UIC), and State Operating Permits (adopted May 1, 1974; amended February 11, 1982)..	147.1250
Mississippi: (1) (i) Mississippi Code Annotated (MCA), Section 5–9–9 (Supp. 1988); (ii) MCA, Sections 53–1–1 through 53–1–47, inclusive and Sections 53–1–71 through 53–1–77, inclusive (1972 and Supp. 1988); (iii) MCA, Sections 53–3–1 through 53–3–165, inclusive (1972 and Supp. 1988); (2) State Oil and Gas Board Statewide Rules and Regulations, Rules 1 through 65, inclusive (Aug. 1, 1987, as amended, Sept. 17, 1987)..	147.1251

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Missouri: (1) Revised Statutes of the State of Missouri, Volume 2, sections 204.016, 204.026, 204.051, 204.056 and Volume V, section 577.155 (1978 and Cumm. Supp. 1984); (2) Missouri Code of State Regulations, title 10, division 20, Chapter 6, sections 20–6.010, 20–6.020, 20–6.070, 20–6.080, 20–6.090, and title 10, division 20, Chapter 7, section 20–7.031 (1977, amended 1984)..	147.1300
Nebraska: (1) Rules and Regulations of the Nebraska Oil and Gas Conservation Commission, Rules 1–6 (as published by the Commission, May 1981); (2) Nebraska Revised Statutes §§ 57–903, 57–906 (Reissue 1978)..	147.1400
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New Hampshire: (1) New Hampshire Revised Statutes Annotated § 149:8 III(a) (1978); (2) New Hampshire Code of Administrative Rules, Part Wc 410 (Protection of Groundwaters of the State, §§ Ws 410.1 through Ws 410.16) (Issue Ws 3–82)..	147.1500
New Jersey: (1) Water Pollution Control Act, New Jersey Statutes Annotated §§ 58:10A–1 through 58:10A–14 (1982); (2) Regulations Concerning the New Jersey Pollutant Discharge Elimination System, New Jersey Administrative Code §§ 7:14A–1.1 through –1.10 (subchapter 1), 7:14A–2.1 through 2.15 (subchapter 2), 7:14A–5.1 through –5.16 (subchapter 5), and 7:14A–10.13 (as published by the State of New Jersey Department of Environmental Protection, March 1981)..	147.1550
New Mexico: (1) Oil and Gas Act, New Mexico Statutes Annotated §§ 70–2–1 through –36 (1978); (2) *State of New Mexico Energy and Mineral Department, Oil Conservation Division—Rules and Regulations* (dated 10–1–78), §§ B–3, I–701 through I–708, M–1100 through M–1121..	147.1600
New Mexico: (1) New Mexico Water Quality Control Commission Regulations (WQCC 82–1) §§ 1–100 through 5–300 (September 20, 1982)..	147.1601
North Dakota: (1) North Dakota Century Code sections 38–12–01, 39–12–03 (1980); sections 61–28–02, 61–28–06 (Supp. 1980); (2) North Dakota Administrative Code sections 33–25–01–01 through 33–25–01–18 (1983); (3) sections 43–02–02–01, 43–02–02–12, 43–02–02–16 through 43–02–02–26, 43–02–02–29, 43–02–02–31, 43–02–02–35 (1978) (4) sections 43–02–02–1–01 through 43–02–02–1–18 (1984)..	147.1751

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hio: (1) Ohio Revised Code Annotated, §§ 1509.01, 1509.03, 1509.221 (Supp. 1983); (2) Rules of the Division of Oil and Gas, Ohio Administrative Code, §§ 1501:9–7–01 through 7–14 (1984); (3) Ohio Revised Code Annotated, §§ 6111.04, 6111.043, 6111.044 (Supp. 1983); (4) Rules of the Ohio Environmental Protection Agency, Ohio Administrative Code §§ 3745–34–01, through 34–41; 3745–9–01 through 9–11 (Director Ohio EPA Order, June 18, 1984)..	147.1801
klahoma: (1) Oklahoma Statutes title 63 §§ 1–901, 1–903 (1981); (2) Oklahoma Controlled Industrial Waste Disposal Act, Oklahoma Statute Annotated title 63 §§ 1–2002, 1–2014 (West Supp. 1983–1984);.	147.1850
regon: (1) Oregon Revised Statutes, Title 16, Ch. 164, sections 164.785; Title 36, Ch. 468, sections 468.005, 468.065 to 468.070, 468.700 to 468.815; (2) Title 43, Ch. 520, sections 520.005, 520.095, 520.155 to 520.330 (1983); (3) Oregon Administrative Rules, 340 Division 44 sections 340–44–005 to 340–44–055 (October 1983); (4) sections 340–45–005 to 340–45–070 (June 1980); (5) Ch. 632, sections 632–10–002 to 632–10–235 (October 1982); (6) sections 632–20–005 to 632–20–159, sections 632–20–170 to 632–20–180 (January 1981)..	147.1900
Rhode Island: (1) Rhode Island Gen. Laws §§ 46–12–1, 46–12–5, and 46–12–28 (Supp. 1983); (2) "Underground Injection Control Program Rules and Regulations." State of Rhode Island and Providence Plantations Department of Environmental Management. Division of Water Resources (as received by the Secretary of State, May 21, 1984)..	147.2000
South Carolina:(1) Pollution Control Act, S.C. Code Ann §§ 48–1–10, 48–1–90, 48–1–100, 48–1–110 (Law. Co-op. 1976 and Supp. 1983); (2) South Carolina Department of Health and Environmental Control, Ground-Water Protection Division, Underground Injection Control Regulations, R–61–87, Effective Date: June 24, 1983..	147.2050
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Utah: (1) General Rules and Regulations and Rules of Practice and Procedure, by Order of: Board of Oil, Gas and Mining (of the State of Utah) (amended to March 23, 1978), as amended by Cause No. 190–4, Rule I—Underground Injection Criteria and Standards (adopted May 27, 1982)..	147.2251
Vermont: (1) Vt. Stat. Ann. tit. 10, sections 1251, 1259, 1263 (1973 and Supp. 1981), Effective date: July 1, 1982; (2) Vermont Department of Water Resources and Environmental Engineering, Chapter 13 Water Pollution Control Regulations, Subchapter 13.UIC—Underground Injection Control, Discharges to Injection Wells, Effective Date: June 21, 1984..	147.2300

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Wisconsin: (1) Wisconsin Statutes Annotated §§ 147.015, 147.02 and 147.04 (West 1974 and Supp. 1983); (2) Chapter NR 112, Well Construction and Pump Installation, Wisconsin Administrative Code §§ NR 112.03 and 112.20 (1981), as amended by Natural Resources Board Order No. WQ–25–82, approved by the Wisconsin Natural Resources Board on August 25, 1982; (3) Chapter NR 113, Servicing Septic Tanks, Seepage Pit, Grease Traps or Privies, Wisconsin Administrative Code §§ NR 113.07–113.08 (1979), as amended by Natural Resources Board Order No. WQ–25–82, approved by the Wisconsin Natural Resources Board on August 25, 1982; (4) Chapter NR 181, Hazardous Waste Management, Wisconsin Administrative Code §§ NR 181.04 and 181.415 (1981); (5) Chapter NR 210, Sewage Treatment Works, Wisconsin Administrative Code § 210.05, created by Natural Resources Board Order No. WQ–25–82, approved by the Wisconsin Natural Resources Board on August 25, 1982; (6) Chapter 214, Land Application and Disposal of Liquid Industrial Wastes and By-Products, Wisconsin Administrative Code §§ 214.03 and 214.08 (1983)..	147.2500
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The Environmental Protection Agency reorganized permit program requirements governing the Hazardous Waste Management Program at 48 FR 14146, April 1, 1983. The reorganized regulations concern the National Pollutant Discharge Elimination System (NPDES), Underground Injection Control (UIC), Dredge or Fill (404), and Resource Conservation and Recovery Act (RCRA) Programs. Part 122 was distributed into applicable portions of new Parts 122, 144, 233, and 270. Part 123 was distributed into applicable portions of new Parts 123, 145, 233, and 271.

The following tables show the relationship of the old CFR sections in Parts 122 and 123 to the new CFR sections in Parts 122, 123, 144, 145, 233, 270, and 271.

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122.5	122.6.
Signatories to permit applications and reports	
122.6	122.22.
Conditions applicable to all permits	
122.7	122.41. (All sections are same paragraphs.)
Establishing permit conditions	
122.8	122.43.
Duration of permits	
122.9	
(a)	122.46(a).
(b)	Removed.
(c)	Removed.
(d)	122.46(b).
(e)	122.46(c).
Schedules of compliance	
122.10	122.47
Requirements for recording and reporting of monitoring results	
122.11	122.48.
Considerations under Federal law	
122.12	122.47.
Effect of a permit	
122.13	122.5
Transfer of permits	
122.14	122.61
Modification or revocation and reissuance of permits	
122.15	122.62.
(a)(5)(i)	122.62(a)(5).
(a)(5) (ii)–(xi)	122.62(a) (6)-(15).
(a)(6)	Removed.
Termination of permits	
122.16	122.64.
Minor modifications of permits	
122.17	122.63.
(g)	(e).
Noncompliance and program reporting by the Director	
122.18	123.45.
(b)	Removed.
(c)	123.45(b).
(d)	Removed.
(e)	123.45(c).
Confidentiality of information	
122.19	122.7.

Old section	New section
Purpose and scope of Subpart D	
122.51	
(a)	Removed.
(b)	122.1(g).
(c)(1)	122.1(b).
(c)(2)	122.3.
Prohibitions	
122.52	122.4.
Application for a permit	
122.53	
(a)	122.21(a).
(b)	122.21(c).
(c)	122.21(d).
(d)	122.21(g).
(e)	122.21(h).
(f)	122.21(i).
(g)	122.21(j).
(h)	122.21(k).
(i)	122.21(l).
(j)	122.21(m).
(k)	122.21(n).
Concentrated animal feeding operations	
122.54	122.23.
Concentrated aquatic animal production facilities	
122.55	122.24.
Aquaculture projects	
122.56	122.25.
Separate storm sewers	
122.57	122.26.
Silvicultural activities	
122.58	122.27.
General permits	
122.59	122.28.
Additional conditions applicable to all NPDES permits	
122.60	122.41.
(a)	122.41(a).
(b)	122.41(c).
(c)	122.41(j)(4), (5).
(d)	122.41(k).
(e)	122.41(l)(3).
(f)	122.41(l)(6).
(g)	122.41(m).
(h)	122.41(n).
Additional conditions applicable to specified categories of NPDES permits	
122.61	122.42.
Establishing NPDES permit conditions	
122.62	122.44.
Calculating NPDES permit conditions	
122.63	122.45.
Duration of certain NPDES permits	
122.64	
(a)	122.46(d).
(b)	122.46(e).
(c)	122.46(f).
Disposal of pollutants into wells, into publicly owned treatment works or by land application	
122.65	122.50.
New sources and new dischargers	
122.66	122.29.
Purpose and scope	
123.1	
(a)	123.1(a), (c).
(b)	Removed.
(c)	Removed.
(d)	Removed.
(e)	123.1(e).
(f)	123.1(c).
(g)	123.1(d).
(h)	123.1(f).
(i)	Removed.
(j)	123.1(h).
(k)	123.1(i).
Definitions	
123.2	123.2.
Elements of a program submission	
123.3	123.21.
Program description	
123.4	123.22.
Attorney General's statement	
123.5	123.23.
Memorandum of agreement with Regional Administrator	
123.6	
(e)	123.24(d).
(g)	123.24(e).
Requirements for permitting	
123.7	123.25.
(a)(1)	123.25(a)(4).
(a)(2)	123.25(a)(5).
(a)(3)	123.25(a)(12).
(a)(4)	123.25(a)(14).
(a)(5)	123.25(a)(17).
(a)(6)	123.25(a)(18).
(a)(7)	123.25(a)(19).
(a)(8)	123.25(a)(2).
(a)(9)	123.25(a)(21).
(a)(10)	123.25(a)(22).
(a)(11)	123.25(a)(23).
(a)(12)	123.45.
(a)(13)	123.25(a)(3).
(a)(14)	123.25(a)(24).
(a)(15)	123.25(a)(25).
(a)(16)	123.25(a)(26).
(a)(17)	123.25(a)(27).
(a)(18)	123.25(a)(28).
(a)(19)	123.25(a)(29).
(a)(20)	123.25(a)(30).
(a)(21)	123.25(a)(31).
(b)	Removed.
(c)	Removed.
(d)(1)	123.25(a)(1).
(d)(2)	123.25(a)(4).
(d)(3)	123.25(a)(6).
(d)(4)	123.25(a)(7).
(d)(5)	123.25(a)(8).
(d)(6)	123.25(a)(9).
(d)(7)	123.25(a)(10).
(d)(8)	123.25(a)(11).
(d)(9)	123.25(a)(12).
(d)(10)	123.25(a)(13).
(d)(11)	123.25(a)(15).
(d)(12)	123.25(a)(16).
(d)(13)	123.25(a)(17).
(d)(14)	123.25(a)(20).
(d)(15)	123.25(a)(32).
(d)(16)	123.25(a)(33).
(d)(17)	123.25(a)(34).
(d)(18)	123.25(a)(36).

Old section	New section
(d)(19)	123.25(a)(37).
(e)	123.25(b).
Requirements for compliance evaluation programs	
123.8	123.26.
Requirements for enforcement authority	
123.9	123.27.
(a)(3)(iii)(A)	123.27(a)(3)(i).
(a)(3)(iii)(B)	123.27(a)(3)(ii).
(a)(3)(iii)(C)	123.27(a)(3)(iii).
Sharing of information	
123.10	123.41.
Coordination with other programs	
123.11	123.3.
Approval process	
123.12	123.61.
Procedures for revision of State programs	
123.13	
(g)	123.62(e).
Criteria for withdrawal of State programs	
123.14	123.63.
Procedures for withdrawal of State programs	
123.15	123.64.
Purpose and scope	
123.71	
(a)	123.1(a).
(b)	123.1(b).
(c)	123.1(g).
(d)	123.1(d).
Control of disposal of pollutants into wells	
123.72	123.28.
Receipt and use of Federal information	
123.73	123.42.
Transmission of information to EPA	
123.74	123.43.
EPA review of and objections to State permits	
123.75	123.44.
Prohibitions	
123.76	123.29.
Approval process	
123.77	123.61.

UIC PROGRAM

Old section	New section
What are the consolidated regulations	
122.1	144.1.
Purpose and scope of Part 122	
122.2	144.1.
Definitions	
122.3	144.3.
Application for a permit	
122.4	144.31.
(a)	Removed.
(b)	144.31(b).
(c)	144.31(d).
(d)	144.31(e).
(e)	144.31(f).
Continuation of expiring permits	
122.5	144.37.
Signatories to permit applications and reports	
122.6	144.32.
Conditions applicable to all permits	
122.7	144.51(a)–[illegible].
Establishing permit conditions	
122.8	
(a)	144.52(a).
(b)(1)–(3)	144.52(b)(1)–(3).
(c)	144.52(c).
Duration of permits	
122.9	144.36.
(c)	144.36(a).
(d)	144.36(b).
(e)	144.36(c).
Schedule of compliance	
122.10	144.53.
(a)(1)(ii)	144.53(a)(1)(i).
(a)(3)	144.53(a)(2).
(a)(4)	144.53(a)(3).
Requirements for recording and reporting of monitoring results	
122.11	144.54.
Considerations under Federal law	
122.12	144.4.
Effects of a permit	
122.13	144.35.
Transfer of permits	
122.14	144.38.
Modification of revocation and reissuance of permits	
122.15	144.39.
Termination of permits	
122.16	144.40.
Minor modification of permits	
122.17	144.41.
(f)(1)	144.41(e).
(f)(2))	144.41(f).
(f)(3))	144.41(g).
Noncompliance and program reporting by the Director	
122.18	144.8.
(c)	144.8(b).
(c)(4)	144.8(b)(2).
(e)	144.8(c).
Confidentiality of information	
122.19	144.5.
Purpose and scope of Subpart C (rewritten)	
122.31	144.1.
Classification of wells	
122.32	144.6.
Prohibition of unauthorized injection	
122.33	144.11.

Old section	New section
Prohibition of movement of fluid into underground sources of drinking water	
22.34	144.12.
dentification of underground sources of drinking water and exempted aquifers	
22.35	144.7.
Elimination of certain Class IV wells	
122.36	144.13.
uthorization of underground injection by rule	
122.37	
(a)(1)	144.21.
(a)(2)	144.22.
(a)(3)	144.23.
(a)(4)	144.24.
(b)	144.25.
(c)	144.26.
(d)	144.15.
Application for a permit; authorization by permit	
122.38	
(a)	144.31(a).
(b)	144.31(c).
(c)	144.31(g).
Area permits	
122.39	144.33.
Emergency permits	
122.40	144.34.
Additional conditions applicable to all UIC permits	
122.41	
(a)	144.51(a).
(b)	144.51(j)(2)(ii).
(c)	144.51(m).
(d)	144.51(l)(6).
(e)	144.51(n).
Establishing UIC permit conditions	
122.42	
(a)	144.52(a)(1).
(b)	144.52(a)(2).
(c)	144.52(a)(3).
(d)	144.52(a)(4).
(e)	144.52(a)(5).
(f)	144.52(a)(6).
(g)	144.52(a)(7).
(h)	144.52(a)(8).
(i)	144.52(b)(1).
Waiver of requirements by Director	
122.43	144.16.
Corrective action	
122.44	144.55.
Requirements for wells injecting hazardous waste	
122.45	144.14.
Promulgation of Class II programs for Indian lands	
122.46	144.2.
Purpose and scope	
123.1	
(a)	145.1(a).
(b)	Removed.
(c)	145.1(b).
(d)	145.1(c).
(e)	145.1(d).
(f)	145.31(d).
(g)	145.21(e).
(h)	145.1(f).
123.1(i)	Removed.
123.1(j)	145.21(f).
123.1(k)	145.1(g).
Definitions	
123.2	145.2.
Elements of a program submission	
123.3	145.21.
Program description	
123.4	145.22.
(g)	145.22(f).
Attorney General's statement	
123.5	145.23.
Memorandum of agreement with the Regional Administrator	
123.6	145.24.
Requirements for permitting	
123.7	145.11.
(a)(1)–(21)	145.11(a)(1)–(21).
(c)(1)–(12)	145.11(a)(22)–(33).
Requirements for compliance evaluation programs	
123.8	145.12.
Requirements for enforcement authority	
123.9	145.13.
(a)(3)(ii)(A)	145.13(a)(3)(i).
(a)(3)(ii)(B)	145.13(a)(3)(ii).
Sharing of information	
123.10	145.14.
Coordination with other programs	
123.11	Removed.
Approval process	
123.12	145.31.
Procedure for revision of State programs	
123.13	145.32.
(f)	145.32(e).
Criteria for withdrawal of State programs	
123.14	145.33.
Procedures for withdrawal of State programs	
123.15	145.34.
(a)	145.34(a).
Purpose and scope of Subpart C	
123.51	145.1.
(a)	Removed.
(b)	145.21(a).
(c)	145.21(c).
(d)	145.21(d).
(e)	145.21(e).
Requirement to obtain a permit	
123.52	145.11(a)(27).
Progress reports	
123.53	145.21(b).
Approval process	
123.54	145.31.
(a)–(c)	145.31(a)–(c).
(d)	145.31(e).
Procedures for withdrawal of State UIC programs	
123.55	145.34.

Old section	New section
(a)	145.34(b)(1).
(b)	145.34(b)(2).
(c)	145.34(b)(3).

404 PROGRAM

Old section	New section
What are the consolidated permit regulations? (Purpose and scope of Part 233).	
122.1	233.1.
(a)	233.1(a).
(b)(1) (i)–(iii)	233.1(b) (1)–(4).
(b) (2)–(4)	Removed.
(c) (1)–(2)	233.1(c) (1)–(2).
(d)	Removed.
(e)	233.1(d).
(f)	233.1(e).
Purpose and scope	
122.2	233.2.
(a)	233.2.
(b)	Removed.
Definitions	
122.3	233.3.
Application for a permit	
122.4	233.4.
(a)	233.4(b).
(b)	233.4(c).
(c)	233.4(d).
(d)	233.4(e).
(e)	233.4(f).
Continuation of expiring permits	
122.5	233.5.
(a)–(c)	Removed.
(d)	233.5.
Signatories to permit application and reports	
122.6	233.6.
(a)–(d)	233.6 (a)–(d).
Conditions appliciable to all permits	
122.7	233.7.
(a)–(l)	233.7 (a)–(l).
Establishing permit conditions	
122.8	233.8.
(a)–(b)	233.8 (a)–(b).
(c)	233.8(d).
Duration of permits	
122.9	233.9.
(a)	233.9(a).
(b)–(c)	Removed.
(d)–(e)	233.9 (b)–(c).
Schedules of compliance	
122.10	233.10.
(a)	233.10(a).
(a)(1)	233.10(a)(1).
(a)(1) (i) and (ii)	Removed.
(a)(2)	Removed.
(a)(3)	233.10(a)(2).
(a)(4)	233.10(a)(3).
(b)	Removed.
Requirements for recording and reporting of monitoring results	
122.11	233.11.
(a)–(c)	233.11 (a)–(c).
Consideration under Federal law	
122.12	Removed.
Effect of a permit	
122.13	233.12.
(a)–(b)	233.12 (a)–(b).
(c)	Removed.
Transfer of permits	
122.14	233.13.
(a)	233.13.
(b)	Removed.
Modification or revocation and reissuance of permits	
122.15	233.14.
(a)(1)–(2)	233.14(a)(1)–(2).
(a)(3)(i)–(ii)	233.14(a)(3)(i)–(ii).
(a)(3)(iii)	Removed.
(a)(4)	233.14(a)(4).
(a)(5)	Removed.
(a)(6)	233.14(a)(5).
(b)	233.14(b).
(c)	Removed.
Termination of permits	
122.16	233.15.
(a)(1)	233.15(a).
(a)(2)	233.15(b).
(a)(3)	233.15(c).
(a)(4)	233.15(d).
(b)	Removed.
Minor modification of permits	
122.17	233.16.
(a)–(d)	233.16(a)–(d).
(e)–(g)	Removed.
(h)	233.16(e).
Noncomplianue and program reporting by the Director	
122.18	233.17.
(a)	Removed.
(b)	233.17(a).
(c)	Removed.
(d)	233.17(b).
(e)	233.17(c).
Confidentiality of information	
122.19	233.18.
(a)	Removed.
(b)(1)	233.18(a)(1).
(b)(2)–(3)	Removed.
(b)(4)	233.18(a)(3).
(c)–(d)	Removed.
Purpose and scope	
123.1	233.20.
(a)	233.20(a).
(b)	Removed.
(c)	233.20(b).
(d)	233.20(c).
(e)	233.20(d).
(f)	233.20(e).
(g)	233.20(f).
(h)	233.20(g).
(i)	233.20(h).
(j)	233.20(i).
(k)	233.20(j).

Old section	New section
Definitions	
123.2	Removed.
Elements of a program submission	
123.3	233.21.
(a)–(d)	233.21(a)–(d).
Program description	
123.4	233.22.
(a)–(e)	233.22(a)–(e).
(f)–(g)	Removed.
(h)(1)–(8)	233.22(f)–(m).
Attorney General's statement	
123.5	233.23.
(a)–(b)	233.23(a)–(b).
(c)	Removed.
(d)	233.23(c).
Memorandum of agreement with the Regional Administrator	
123.6	233.24.
(a)	233.24(a).
(b)(1)	Removed.
(b)(2)–(3)	233.24(b)(1)–(2).
(b)(4)	233.24(b)(3.)
(b)(5)	Removed.
(b)(6)	233.24(b)(4.)
(c)	233.24(c).
(d)	Removed.
(e)	Removed.
(f)	233.24(d).
(g)	233.24(e).
Requirements for permitting	
123.7	233.26.
(a)	233.26(a).
(b)–(d)	Removed.
(e)	233.26(b).
Requirements for enforcement evaluation programs	
123.8	233.27.
(a)–(d)	233.27(a)–(d).
(e)	Removed.
Requirements for enforcement authority	
123.9	233.28.
(a)(3)	233.28(a)(4).
(a)(3)(i)–(ii)	Removed.
(a)(3)(iii)	233.28(a)(4)(i).
Sharing of information	
123.10	233.29.
Coordination with other programs	
123.11	233.30.
Approval process	
123.12	233.31.
Procedures for revision of State programs	
123.13	233.32.
(a)–(d)	233.32(a)–(d.)
(e)–(g)	Removed.
(h)	233.32(e).
Criteria for withdrawal of State programs	
123.14	233.33.
Procedures for withdrawal of State programs	
123.15	233.34.
Purpose and scope	
123.91	
(a)	Removed.
(b)	Removed.
(c)	233.20(i).
(d)	233.37(d).
Activities not requiring permits	
123.92	233.35.
Prohibitions	
123.93	233.36.
Applications for a permit	
123.94	233.4.
(a)	233.4(a).
(b)	233.4(b).
(c)	233.4(e).
General permits	
123.95	233.37.
Emergency permits	
123.96	233.38.
Permit conditions	
123.97	233.7.
(a)–(d)	233.7(m)–(p).
Establishing permit conditions	
123.98	233.8.
(a)–(g)	233.8(c)(1)–(7).
Memorandum of agreement with the Secretary	
123.99	233.25.
Transmission of information to EPA and other Federal agencies	
123.100	233.39.
EPA review of and objections to State permits	
123.101	233.40.
Coordination requirements	
123.102	233.41.
Enforcement authority	
123.103	233.28(a)(3)
Approval process	
123.104	233.31.

RCRA PROGRAM

Old section	New section
What are the consolidated permit regulations?	
122.1	270.1.
(a)(1)	270.1(a)(1).
(a)(ii)–(e)	Removed.
Purpose and scope of Part 122	
122.2	270.1.
(b)	Removed.
Definitions	
122.3	270.2.
Application for a permit	
122.4	270.10.
(a)–(c)	270.10(a)–(c).
(d)	270.10(d).
(d)(1)–(d)(4)	270.13(a)–(d).
(d)(5)	270.13(f).
(d)(6)–(d)(8)	270.13(k)–(m).
(e)	270.10(i).

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Old section	New section
Continuation of expiring permits	
122.5	270.51.
Signatories to permit applications and reports	
122.6	270.11.
Conditions applicable to all permits	
122.7	270.30.
(l)(7)–(l)(8)	270.30(l)(10)–(l)(11).
Establishing permit conditions	
122.8	270.32.
(a)–(b)	270.32(a).
(b)(2)–(3)	270.32(c)–(d).
(c)	270.32(e).
Duration of permits	
122.9	270.50.
(b)	270.50(a).
(d)	270.50(b).
(e)	270.50(c).
Schedules of compliance	
122.10	270.33.
(a)(3)–(4)	270.33(a)(2)–(3).
Requirements for recording and reporting of monitoring results	
122.11	270.31.
Consideration under Federal law	
122.12	270.3.
Effect of a permit	
122.13	270.4.
Transfer of permits	
122.14	270.40.
Modification or revocation and reissuance of permits	
122.15	270.41.
(a)(7)	270.41(a)(5).
Termination of permits	
122.16	270.43.
Minor modifications of permits	
122.17	270.42.
(e)(1)–(8)	270.42(e)–(n).
Noncompliance and program reporting by the Director	
122.18	270.5.
(c)	270.5(b).
(c)(3)	270.5(b)(2).
(e)	270.5(c).
Confidentiality of information	
122.19	270.12.
(b)(1)	270.12(b).
References	
122.20	270.6.
Purpose and scope of Subpart B	
122.21	270.1.
(a)	Removed.
(b)(1)–(7)	270.1(a)(3).
(b)(8)	270.1(a)(2).
(c)–(d)	270.1(b)–(c).
(d)(2)(v)	Removed.
(d)(2)(vi)–(viii)	270.1(c)(2)(v)–(vii).
Application for a permit	
122.22	270.10.
(a)–(d)	(e)–(h).
Interim status	
122.23	270.70–270.73.
Qualifying for interim status	
(a)	270.70.
Coverage	
(b)	270.71(a).
Changes during interim status	
(c)	270.72.
Interim status standards	
(d)	270.71(b).
Grounds for termination	
(e)	270.73.
Contents of Part A of the RCRA permit application	
122.24	270.13.
(a)	270.13(b).
(b)	270.13(e).
(c)–(g)	270.13(g)–(j).
Contents of Part B of the RCRA permit application	
122.25	270.14–270.29.
(a)	270.14.
(a)	270.14(b).
(b)(1)	270.15.
(b)(1)(i)–(vi)	270.15(a)–(d).
(b)(2)	270.16.
(b)(2)(i)–(vi)	270.16(a)–(f).
(b)(3)	270.17.
(b)(3)(i)–(ix)	270.17(a)–(i).
(b)(4)	270.18.
(b)(4)(i)–(ix)	270.18(a)–(i).
(b)(5)	270.19.
(b)(5)(i)–(iv)	270.19(a)–(d).
(b)(6)	270.20.
(b)(6)(i)–(viii)	270.20(a)–(h).
(b)(7)	270.21.
(b)(7)(i)–(ix)	270.21(a)–(i).
(c)	270.14(c).
Permits by rule	
122.26	270.60.
Short term permits	
122.27	270.61–270.63.
Emergency permits	
(a)	270.61.
Hazardous waste incinerator permits	
(b)	270.62.
Permits for land treatment demonstrations	
(c)	270.63.
Additional conditions applicable to all RCRA permits	
122.28	270.30.
(b)	270.30(j)(2).
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(b)	Removed.
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